The American Statistician

A Publication of the American Statistical Association

sity Microfilms A/Exch
North First Street
n Arbor, Michigan

June, 1960
Volume 14, No. 3

THE PRESIDENT'S COLUMN 1

NEWS 2

INTERNATIONAL STATISTICAL ACTIVITIES 9

FEDERAL STATISTICAL ACTIVITIES 11

THREE PAPERS IN HONOR OF HAROLD HOTELLING AT 65

- Preface By Ernest Rubin 15
- Harold Hotelling as a Teacher By William G. Madow 15
- Harold Hotelling's Research in Statistics By T. W. Anderson 17
- Harold Hotelling as a Mathematical Economist By Paul A. Samuelson 21

PROGRAM OF THE 120TH ANNUAL MEETING OF ASA Stanford University, August 23-26, 1960 (With the programs of Biometric Society (ENAR) and (WNAR), Institute of Mathematical Statistics and Econometric Society) 28

NEWS ABOUT MEMBERS 40

CHAPTER NOTES 41

$1.50 per year
35 cents per copy

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The American Statistician

JUNE, 1960, VOL. XIV, NO. 3

A publication of the
American Statistical Association

Founded 1839

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News and notes should be sent to Dana Barbour, News Editor, American Statistical Association, 1757 K Street, N.W., Washington 6, D. C.

Second class postage paid at Washington, D. C. *The American Statistician is published five times a year*—February, April, June, October and December—by the American Statistical Association, Editorial Office: 1757 K St., N. W., Washington 6, D. C. Subscription rate: one dollar and fifty cents a year or thirty-five cents per copy.

Anyone wishing to change his mailing address should allow eight weeks notice. A copy of the address taken from an issue of the periodical should accompany the change-of-address request.

The President's Column

Morris H. Hansen

CHAPTERS OF THE ASSOCIATION

I have had the pleasure of visiting and speaking to several of the Chapters of ASA, both during my term as President and while serving on the Board in previous years. The activity of the local groups in the form of meetings and other services to members provides one of the important basic functions of the Association. The opportunities for variety, breadth, and specialization in the talks on various aspects of statistics offer frequent contacts, "cross-fertilization" of ideas, and discussions of problems and new developments in statistics. All this can be conducted in a quite different atmosphere than that of the Annual Meeting, for example. Because of the importance of Chapter activities, I should like to discuss briefly Chapter relationships and other aspects of local activity.

Right now there are 39 chartered Chapters of the Association. (As of this writing, new Chapters have been formed in Harrisburg, Pa. and Arizona, centered in Phoenix. They will request charters at the next meeting of the Board of Directors. Members in those areas who are interested in details are invited to write to the ASA office.) Some of the Chapters were founded a good many years ago; many others have been formed since World War II, pointing up again the rapid growth of statistics in the past fifteen years. Usually one or two new Chapters request a charter each year.

Chapters vary widely in size—some have as few as thirty members in their area; the largest has about one thousand four hundred. The groups also vary considerably in local dues. A few do not charge anything, depending on members' organizations to carry costs such as mailings, postage, printing notices, etc. Most Chapters, however, charge anywhere from one to five dollars yearly to pay for the many expenses involved in continuing Chapter activities and services.

The Association feels that relationships between Chapters and the national society and among the Chapters themselves deserve continuing attention. For this purpose, a committee was established concerned with this activity. It is headed by Howard Jones, a Vice-President of ASA, who has long had a special interest in Chapters and their problems. Members are invited

(Continued on page 45)

NEWS

ANNUAL MEETING DETAILS — ASA OFFICERS NOMINATED — APRIL BOARD MEETING REPORT — U. N. STATISTICAL COMMISSION MEETS — NEW PUERTO RICAN CHAPTER JOURNAL — MEETINGS, CONFERENCES, SUMMER COURSES AND SESSIONS — PUBLICATIONS — JOB OPENINGS

Annual Meeting, August 23-26

Advance registration for the Annual Meeting of the American Statistical Association to be held August 23-26, 1960, at Stanford University, is particularly important to assist the Local Arrangements Committee in arranging for meals, dormitory accommodations and transportation. Forms for preregistration, together with information about the convention, will be mailed from the ASA national office early in July. One registration will include the meetings of the other societies meeting at Stanford at the same time—the Biometric Society-ENAR, the Biometric Society-WNAR, the Econometric Society, the Institute of Mathematical Statistics, the Western Economic Association, and the Western Farm Economic Association.

Accommodations will be available for those wishing to stay on the campus at the rate of $7.16 a day per person for room and meals (two people in a room). A few single accommodations may be had for an additional charge of $2 a day. Children under twelve will be charged half price. Dormitory rooms are not available without meals, but meal service will be available to conferees not staying on the campus.

The Local Arrangements Committee reports that there is frequent limousine service from the San Francisco International Airport to the major hotels and motels in the Stanford vicinity. Arrangements have been made to have the limousines stop at the Stanford dormitory during the meeting. The Greyhound bus can also be used between the airport and Palo Alto. The main line of the Southern Pacific runs along one edge of the campus and local service is available for San Francisco. Visitors coming by way of Southern California are cautioned that the Southern Pacific daytime train does not stop at Palo Alto-Stanford and a transfer to a local train at San Jose will be necessary. The night train, the LARK, does stop at Stanford.

Some of the many attractions of California are described elsewhere in this issue for those who wish to combine a vacation, or at least some sight-seeing, with attendance at the meeting. Such persons may also wish to write to the National Park Service or to the Chamber of Commerce of the cities they plan to visit. The summer climate at Stanford is warm, although nights are cool. Warm clothing may be needed for trips to San Francisco, however, because of the fogs and winds from the Pacific which occasionally blow over the city.

The complete program of the ASA, the Biometric Society-ENAR, the Biometric Society-WNAR, the Econometric Society and the Institute of Mathematical Statistics meetings is printed elsewhere in this issue, subject, of course, to some last-minute changes. A booklet containing the abstracts of the papers to be presented will again be available at the registration desk.

ASA Officers Nominated

The Committee on Nominations of the American Statistical Association, composed of Martin R. Gainsbrugh (Chairman), Gertrude M. Cox and Conrad Taeuber, has nominated officers for 1961. These officers will be voted on by the Association members in the fall. In making its selections for the posts of Vice-President, Directors and Representative-at-Large, the Committee has attempted to insure balance among the sections and fields of interests in the ASA, taking into account the incumbent officers as well as those to be nominated. The President-elect nomination is in accord with the tradition followed for some years of rotating the presidency among academic institutions, government and business. The nominees are:

President-Elect

PHILIP M. HAUSER, University of Chicago

Vice-President (1961-63)

(one to be elected)

ROBERT J. EGGERT, Ford Motor Company

GEOFFREY H. MOORE, National Bureau of Economic Research

Directors (1961-63)

(two to be elected)

DOUGLAS G. CHAPMAN, University of Washington

MRS. DOROTHY MORROW GILFORD, Office of Naval Research

BOYD HARSHBARGER, Virginia Polytechnic Institute

MILTON EVERETT TERRY, Bell Telephone Laboratories

Representative-at-Large (1961-62)

(one to be elected)

ROY L. REIERSON, Bankers Trust Company

WILLIAM H. SHAW, E. I. du Pont de Nemours & Co.

Nominations for District Representatives, which are made by the Chapters or on petition of ASA members, are not complete and will be reported in the next issue.

The current officers of the Association elected by the entire membership, and their terms of office are: President (1960)—Morris H. Hansen; Past-President (1959)—Rensis Likert; President-Elect (1961)—Martin R. Gainsbrugh; Vice-Presidents—George E. P. Box (1960-62), Howard L. Jones (1958-60), and Guy Orcutt (1959-61); Directors—Ralph E. Burgess (1958-60), A. H. Bowker (1959-61), Harold F. Dorn (1960-62), Oscar Kempthorne (1958-60), Raymond T. Bowman (1959-61), and Frederick Mosteller (1960-62); Representative-at-Large—R. E. Johnson (1960-61), and John Thornton Marshall (1959-60).

April Board Meeting

The Board of Directors of the American Statistical Association met in Chicago on April 1. Those present

included President Morris H. Hansen, Past President Rensis Likert, Vice-Presidents George E. P. Box, Howard L. Jones and Guy H. Orcutt, Directors Raymond T. Bowman and Ralph E. Burgess, Secretary-Treasurer Donald C. Riley, and several guests.

Professor Philip J. McCarthy, Cornell University, was renominated for a three-year term as one of the three ASA representatives on the Board of Directors of the Social Science Research Council. (He was subsequently elected by the Council in a mail ballot.) The two continuing representatives from the American Statistical Association are Harold F. Dorn (1960-62) and Nathan Keyfitz (1959-61).

Ralph Burgess, Chairman of the Committee on Institutional Membership, reported that only about half the chapters have thus far appointed local chairmen to solicit institutional memberships in their area. About nine months ago, in a new approach to increase institutional membership, chapters were asked to appoint these chairmen, the arrangement being that the chapters would receive 25 percent of the first year's institutional membership dues for each new membership received. In the discussion which followed it was suggested that the Association make use of both national and local solicitation, with the national committee supplementing local action with direction, promotion and follow-up. The Board confirmed that non-profit organizations such as universities may hold institutional membership at a $50 annual rate—half the minimum for industrial firms.

A progress report on the proposed booklet on statistics as a career was presented by Michael Amrine, who has been serving as public relations consultant to ASA. Plans for this brochure, which is being sponsored jointly by the ASA and the Institute of Mathematical Statistics, were described in the President's Column of the April issue of *The American Statistician*.

President Morris Hansen reported that the Technical Committee on Broadcast Ratings, which the Association had appointed at the request of the Subcommittee on Legislative Oversight of the House Committee on Interstate and Foreign Commerce to undertake an examination and technical evaluation of the statistical methods used by the principal television rating services, was proceeding with its work. This committee has as its members William G. Madow (Chairman), Raymond J. Jessen and Herbert Hyman. A report is not expected before the end of the year at the earliest.

Robert J. Langle, who attended on behalf of Albert Bowker, Chairman of the 1960 Local Arrangements Committee, reported on arrangements for the Annual Meeting, August 23-26. (These are described in the News section of this issue.) Martin Taitel, representing the 1960 Program Committee, reported on the status of the program. (See the preliminary program in this issue.)

The latest draft of the report of the Committee on Publications Policy was presented by Morris Hamburg on behalf of Almarin Phillips, Committee Chairman. There was discussion of a suggestion that the *Journal's* Liaison Editors from the ASA Sections be discontinued, as well as of other points in the draft report. It is expected that the report will be finally submitted for approval at the next meeting of the Board and Council to be held in conjunction with the Stanford meeting.

The new Editor of the *Journal of the American Statistical Association*, Clifford G. Hildreth, reported that his office is now organized and the editorial functions have been transferred from Chicago to Michigan State University, East Lansing. David Wallace, Acting Editor after Allen Wallis' resignation in 1959, gave some figures for 1959. In that year the *Journal* included 830 pages, with 53 articles and 55 reviews. It was the third largest of the volumes issued during the last ten years, both the 1958 and 1955 volumes having been larger. About half the manuscripts submitted are rejected, with about 25 percent more being returned for revision and re-submission.

Robert Ferber, Chairman of the Section on Training, reported that his section has established a Committee on Statistical Bibliography with Ernest Rubin as Chairman. This committee is investigating various possibilities for a bibliography. Mr. Ferber also presented a summary of pros and cons on the preparation of a statisticians' handbook. The problem is to find a qualified person who would be willing to undertake a project of this magnitude. The Board referred the matter back to the Section on Training for further investigation of possibilities.

James W. Knowles, Chairman of the Business and Economic Statistics Section, reported that he has asked Robert E. Johnson, Western Electric Co., to take charge of arrangements for a Summer Refresher Course. Such a course is being prepared under the sponsorship of the Business and Economic Statistics Section for the summer of 1961.

There was some consideration of the possibility of having the Chicago Chapter dues collected by the ASA national office. (ASA now collects dues for several chapters.) Howard L. Jones is to discuss this further with the officers of the Chicago Chapter and work out arrangements if the Chapter wishes to take advantage of this service. Mr. Jones said he would like to see consideration given to a plan, similar to that followed by the American Society for Quality Control, whereby part of the dues collected by the national organization is remitted to each Chapter. He thought this would not be feasible, however, on an Association-wide basis until national dues are increased. The Board thought this possibility should be given further study by the Committee on Chapter and Regional Activities, of which Mr. Jones is Chairman.

The 1959 audit reports of the Association and of the magazine, *Technometrics*, prepared by the accounting firm of Alexander Grant & Co., were distributed to the Board. These, together with the 1959 reports of the Board of Directors and the Secretary-Treasurer, will be printed in the June issue of the *Journal of the American Statistical Association*. The Board was informed that arrangements have been made for the national office of the Association to handle advertising promotion for *Technometrics*, *Biometrics*, and the *Annals of Mathematical Statistics*, in addition to the *Journal* and *The American Statistician*.

Eleventh Session of UN Statistical Commission

The eleventh session of the United Nations Statistical Commission was held at UN Headquarters in New York, April 20 to May 5, 1960. With the exception of Cuba, whose representative was unable to attend, all countries holding membership in the Commission were represented at the session (Australia, Brazil, China, Denmark, France, India, Ireland, Netherlands, New Zealand, Romania, Ukranian S.S.R., U.S.S.R., United Kingdom, and United States). The session was also attended by representatives of several specialized agencies and non-governmental organizations, including the International Labor Organization; Food and Agriculture Organization; United Nations Educational, Scientific and Cultural Organization; International Monetary Fund; International Civil Aviation Organization; World Health Organization; the International Chamber of Commerce; International Confederation of Free Trade Unions; International Statistical Institute and Inter American Statistical Institute. Raymond T. Bowman, Assistant Director for Statistical Standards, Bureau of the Budget, attended the session as the United States Representative on the Commission, and was accompanied by Harry Venneman, Office of Statistical Standards, Bureau of the Budget. M. D. McCarthy (Ireland) was elected Chairman, M. Levente (Romania) Vice-Chairman, and J. V. T. Baker (New Zealand) Rapporteur.

The Commission reviewed a proposal for combining the Standard International Trade Classification (SITC) and the Brussels Tariff Nomenclature (BTN) and approved modifications in the SITC needed to give effect to the proposal, requesting that the new arrangement be utilized in the publication of international trade statistics by United Nations bodies, beginning with data for the year 1960. The Commission also approved recommendations for the 1963 World Program of Basic Industrial Inquiries (including modifications of the International Standards for Basic Industrial Statistics which had previously been adopted); and made specific suggestions concerning further work on the questions of the statistical unit in economic inquiries, including a comparative study of problems and practices in the field of enterprise statistics. Progress reports were reviewed and suggestions for future work were formulated with respect to wholesale price statistics, statistics of capital formation in underdeveloped countries, input-output, national accounts statistics and related topics, balance of payments statistics, and classification of government transactions.

Considerable attention was devoted to several aspects of work in fields of social statistics, including suggestions on the content of the first issue of a Compendium of Social Statistics which is to be published in 1963. Questions in the field of housing statistics were discussed, with particular reference to statistical indicators of housing conditions and methods of estimating housing needs; and guidance was provided for future work in the field. Further consideration was given also to questions of the international definition and measurement of levels of living, the methodology of household surveys, the status of population and housing census programs, and other demographic statistics. In connection with its consideration of these and other topics on the agenda for the session, the Commission stressed the need for greater emphasis on methods and measures to improve the quality of basic data, with particular attention to the needs of under-developed countries. The value of sampling methods was also stressed in various connections, and the Commission recommended the convening of an *ad hoc* working group of specialists in sample survey methods for the purpose of recommending methods of collecting data for the Compendium of Social Statistics and for social programs generally, particularly in the less developed countries.

The Commission noted that there is "still an urgent need for statistical education and training at all levels"; but also pointed out, as "of equal importance", the need that remains "for many governments to give proper weight to statistics and statisticians in their governmental organizations."

Copies may be obtained from the Statistical Office of the United Stations, New York, N.Y.

New Puerto Rican Economic and Statistics Review

The Puerto Rico Economic and Statistics Association, one of the chapters of the American Statistical Association, has started a new journal designed particularly as a medium for the publication of papers and articles of interest to economists, statisticians and planners concerned with rapidly developing economies. The first issue of this journal, *Economic and Statistics Review of Puerto Rico (Revista de Economia y Estadisticas de Puerto Rico)*, appeared in October 1959. For the present the *Review* will be published semi-annually, but it is expected that the frequency will be increased later to three or four times a year. The editor is Alvin Mayne, Puerto Rico Planning Board and University of Puerto Rico, who is also President of the Puerto Rican Economic and Statistics Association.

While the new Journal will be largely concerned with Puerto Rican problems, the first issue includes articles on the Latin American common market, the capital investment program in India, and population changes and economic growth in Israel. The Honorable Luis Munoz Marin, Governor of Puerto Rico, writes on "The Role of Economic Planning from the Viewpoint of the Chief Executive", and there is an article on "The Program of Economic Stabilization in Puerto Rico" by Felix Mejias, President and General Manager of the Metropolitan Bus Company. In addition there are brief statements by commentators on several of the articles.

The *Review* includes material in English and Spanish. The article is printed in the language which the author submitted, followed by a summary in the second language.

Subscription rates to the new periodical are $2.50 a year, or $1.25 for a single copy. Inquiries to: Alvin Mayne, Puerto Rico Planning Board, Santurce 29, P. R.

Biometric Society, ENAR—IMS Meeting

The Eastern North American Region of the Biometric Society held its Spring meeting jointly with the Eastern Region of the Institute of Mathematical Statistics at Columbia University in New York on April 21-23, 1960. Among the highlights of the meeting were sessions on Queueing, Multivariate Analysis, Analysis of Variance, Clinical Trials, and various selected topics. Invited addresses were presented by Professor A. Hald of the University of Copenhagen and by Professor James Durbin of the University of North Carolina. The combined attendance of the two societies was approximately 200.

The 1960 officers of the Eastern North American Region of the Biometric Society are Walter T. Federer, President; Oscar Kempthorne, President-Elect; Marvin A. Kastenbaum, Secretary-Treasurer. The Regional Committee is composed of William G. Cochran, J. Cornfield, David B. Duncan, Boyd Harshbarger, H. O. Hartley, and H. L. Lucas.

Meeting of ORSA-SIAM-TIMS Washington Area Members

A meeting of interest to the Washington, D. C., area took place on April 6 in Arlington, Virginia, when 95 of the local members of the Operations Research Society of America, the Society for Industrial Applied Mathematics, and The Institute of Management Sciences met jointly. The purpose of the meeting was the establishment of a group devoted to problem solving for professional operation research workers in the local area.

Enthusiastic support was given to meetings of the following types:

(a) Problem solving by voluntary working groups drawn from the membership.
(b) Informal "clinic" type presentations or panel discussions of work in progress by the membership.
(c) A lecture series by local members on finished projects, emphasizing the creative aspects of the problem solved rather than the ultimate results only.
(d) A professional "workshop" to review OR techniques.
(e) Operational analysis of real problems of general concern, such as traffic problems or future school requirements.

If the meetings of this nature succeed in their goals, they may lead to a local ORSA chapter. The local members responsible for the introduction of Washington area meetings are: Saul Gass, E. Glaser, T. N. E. Greville, T. L. Saaty, R. P. Smith, R. S. Tichen, James Vernon, and Kenneth Webb.

The April 6 meeting was highlighted by a talk by Dr. Charles Flagle of the Operations Research Group, Johns Hopkins University Hospital, on the problems of implementing OR results in the hospitals.

A second meeting, dealing with metropolitan area traffic problems, was held May 10. The speaker at this meeting was Mr. Joseph Rice, D. C. Bureau of Traffic and Operations.

A meeting on problems in cancer research is scheduled for June 22 in the CEIR Conference Room (Area B), Arlington, Virginia. Dr. Michael Shimkin, Cancer Institute, N.I.H., will be the speaker.

European Conference on Quality Control

The European Organization for Quality Control is holding a Conference on Quality Control in London, September 1-3, 1960. Sessions will be held on Quality from the Viewpoint of Management, Reducing the Cost of Inspection, Diagnosis of Trouble in Manufacture, and New Concepts in Quality Control. Americans presenting papers include Professor Paul Clifford, whose subject is "Achievement of the Established Quality Level," and Dr. Ellis Ott, who will speak on "Short Cuts to Diagnosis." Dr. George E. B. Box has been invited to give a paper on "Evolutionary Operation."

The Conference will be bi-lingual, with simultaneous interpretation into English and French of each period of discussion as well as each paper.

Further information may be obtained from the British Productivity Council, 21 Tothill Street, London, S.W.I., England, which is organizing the meeting.

TIMS Seventh International Meeting

The Institute of Management Sciences is holding its seventh international meeting at the Hotel Roosevelt, New York City, October 20-22, 1960. Sessions are scheduled on Behavioral Science and Management Science, Applications and Tools of Management Science, and Use of Computers in Simulation. There will be contributed papers presenting ten-minute descriptions of discoveries or conclusions as well as longer invited papers providing more general treatment of broader areas.

The registration fees are $15.00 for members, $20.00 for non-members, and $5.00 for students. Further information may be obtained from Mr. James Townsend, 30 East 42nd Street, New York 17, New York.

Berkeley Symposium on Mathematical Statistics and Probability

The Statistical Laboratory of the University of California is holding the Fourth Symposium on Mathematical Statistics and Probability at Berkeley from June 20 through July 30, 1960. The Symposium is organized by the Statistical Laboratory with the financial support of the National Science Foundation, the Office of Naval Research, the Office of Ordnance Research, the Air Force Office of Scientific Research and the National Institutes of Health. Symposium lectures are arranged in four cycles: Theory of Probability and Theory of Statistics, conducted concurrently from June 20 to July 15; Problems of Health, July 18 to July 25; and Probability and Statistics in Physical Sciences, July 26 to July 29. Ordinarily there will be four lectures or papers each day. About 50 foreign scholars will participate, as well as many American statisticians and probabilists. Lectures will be interspersed with a three-day excursion to the

Sierra Nevada Mountains and shorter trips to other places of interest.

Inexpensive single rooms and other accommodations may be obtained through the University Housing Office, University of California, Berkeley 4, California. Further information about the Symposium may be gotten from Professor J. Neyman, Statistical Laboratory, University of California.

UCLA Course in Statistical Methods in Industry

The Department of Engineering of the University of California at Los Angeles is offering an expanding Statistical Methods in Industry program August 1-19, 1960. This program is arranged to serve various levels in modern industry—inspectors, managers, engineers and scientists. In addition to five courses there will be seven seminar or special laboratory groups and a series of nine luncheon lectures and two dinner lectures presented by outstanding individuals from industry, education and government. The five courses are: "Quality Control by Statistical Methods"—a course for the beginner in quality control; "Industrial Statistical Methods"—a more advanced treatment of statistical principles and techniques of interest to modern industry; "Design and Analysis of Industrial Experiments"; "Industrial Reliability"—a course for persons with a degree in Engineering or Science or equivalent industrial experience; and "Basic Measurements and Standards"—planned for those with technical interest in electrical measurements and standards. Each participant will choose one of the courses and one seminar or special laboratory group.

Interested individuals or companies may obtain further information from Professor Edward P. Coleman, Department of Engineering, University of California, Los Angeles 24, California.

Pulp and Paper Statistics Course

The Institute of Statistics of North Carolina State College will conduct the ninth Pulp and Paper Statistics course, jointly sponsored by the Technical Section of the Canadian Pulp and Paper Association and the Technical Association of the Pulp and Paper Industry (TAPPI). This course will be held at Brevard College, Brevard, N. C., August 8-19, 1960. Two sections, a Basic Section and an Advanced Section, will be conducted concurrently. The former will cover the basic concepts of statistics, with lectures and a number of laboratory sessions based on examples from the pulp and paper industry. The latter will include lectures and laboratory sessions on multiple regression analysis, response surface methodology, experimental design and analysis of variance, variance components, and linear programming. The staff is to be composed of Dr. A. H. E. Grandage, Institute of Statistics, N. C. State College; Dr. R. J. Hader, Institute of Statistics; Carl E. Noble, Kimberly-Clark Corporation; Dr. Allan E. Paull, Abitibi Power and Paper Co., Ltd.; and M. S. Renner, Dewey and Almy Chemical Co.

Address inquiries to: Dr. J. R. Hader, The Institute of Statistics, N. C. State College, Raleigh, N. C.

State of Hawaii Department of Planning and Research

(The following news article was prepared by Frank Lombardi, Director of the State Planning Office, Hawaii, for the *Statistical Reporter*, published by the Office of Statistical Standards, U.S. Bureau of the Budget. It is reprinted here with the permission of the author and the Office of Statistical Standards.)

Coordination of all statistical programs of the State is expected to be one of the major activities of the State of Hawaii Department of Planning and Research. This new department was established by Act 1 of the First State Legislature, Second Special Session, and was signed by Governor Quinn on November 25, 1959. It will become effective in January 1961.

Under the new legislation the Department of Planning and Research will assume most functions of the existing State Planning Office and the research functions of the Economic Planning and Coordination Authority. The act provides that the new department shall "plan for the optimum use of the human and natural resources of the state. It shall plan for the development of the economy of the state and, as instructed by the governor, shall present such plans to the governor and to the legislature. In its planning and as a service to other departments of the state, the department shall collate factual data relating to the people, resources, needs and development of the state. The department shall prescribe a standardized statistical reporting system."

The following research program for the new department is contemplated by the present planning staff:

1. Coordination of State research activities, including definition and standardization of statistical areas and names or other designations; continued sponsorship of the Honolulu Census Tract Committee; standardization of tabular and graphic presentation by State agencies; review of research responsibilities, functions and projects of other agencies better to avoid duplication and fill gaps; maintenance of an inventory of local research in progress; and participation in various research committees.

2. Provision of consultative sevices to other agencies, as requested.

3. Work on specific research projects, such as the economic studies needed to keep the State General Plan up to date; a continuing inventory of residential and nonresidential construction by census tract or census county division; a biennial sample census of population, housing, labor force, and business establishments; periodic estimates of current and future population distribution and characteristics; periodic estimates of personal income and gross state product; basic research in the visitor industry; and special land use studies.

4. Preparation of an annual State statistical abstract.

5. Maintenance of a planning and research library.

The present staff of the State Planning Office is expected to form the nucleus of the Department of Planning and Research. The Director of Planning will continue to be responsible for both planning and research functions of the department, assisted by an Assistant Director.

1959 U. N. Statistical Yearbook

The eleventh issue of the Statistical Yearbook, prepared by the Statistical Office of the United Nations, was published in May. The statistical authorities of more than 150 countries and territories, as well as U. N. agencies and other intergovernmental bodies, cooperated actively in its preparation.

The Yearbook contains 618 pages and 190 tables of statistics on demographic, economic, financial, social and cultural subjects. The years covered are generally 1948 and 1950-1958, with some data for 1959. As in previous issues, there is an appendix of conversion coefficients and factors, and there are both subject and country indexes. Several of the tables have been revised or expanded in this issue, and a few new ones have been introduced, including tables on world and regional energy production, gross domestic fixed capital formation and increase in stocks, and index numbers of world trade by regions and countries.

The "Statistical Yearbook, 1959" may be purchased for $8 paperbound or $10 clothbound from the U.N. Bookshop or the Columbia University Press, 2960 Broadway, New York 27, N. Y.

Job Openings

The Food and Agriculture Organization of the United Nations needs statisticians for its Technical Assistance Programs in Asia, Africa, the Middle East and Latin America. It also needs statisticians for the permanent posts of Regional Statistician at Bangkok and of the Chief of the Food Consumption Section of the Statistics Division at Rome. Salaries range from $7,000-$12,000 plus income tax reimbursement and allowances. For information, write to Dr. P. V. Sukhatme, Director of Statistics Division, FAO, Rome, Italy.

The Bureau of Ships, Department of the Navy, has openings for mathematical statisticians in salary ranges from $7,510 to $11,595. The vacancies exist at the Departmental Headquarters in Washington, D. C. and at some of the Bureau's laboratories on both the East and West Coasts. These positions are responsible for experimental design, probability applications in reliability, and in weapon systems studies. In addition to the major responsibilities, other functions include consultation with engineers and scientists on a wide variety of statistical engineering problems and research in statistical methodology.

Interested persons should write to the Bureau of Ships, Code 263C, Washington 25, D. C., Attention Mr. Richard J. Barry.

Contributions to Probability and Statistics

ESSAYS IN HONOR OF HAROLD HOTELLING

Edited by *Ingram Olkin, Sudhish C. Ghurye, Wassily Hoeffding, William G. Madow, Henry B. Mann.* This volume consists of some 40 papers by eminent figures in the fields of statistics, probability theory, economics, and biology. The papers include both applied and theoretical material and deal with such varied topics as factorial experiments, decision theory, stochastic theories of responses, nonrepresentative samples, factorial designs, boundary theory, families of distributions, maximum likelihood estimation, analysis of variance, ranking, block designs, classification procedures, multiple regression, contaminated distributions, and multidimensional scatter. $6.50

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International STATISTICAL ACTIVITIES

BIOMETRIC SOCIETY

In 1959 the **German Region of the Biometric Society** started a quarterly journal, *Biometrische Zeitschrift*. In this journal are published original papers on biometrical and biomathematical subjects, reports on meetings, reviews and abstracts.

Among others the first volume (1959) contained: Contributions to discriminatory analysis; Basis and possible applications of the method of path coefficients; Biometrical deduction of the distribution of elements of taxonomic units of the natural system in a logarithmic series; On the beginnings of statistics and biometrics; Principles and methods of multiple factor analysis; On the calculation of coefficients of inbreeding and relationship; Methods of time series theory in biometrics; Calculation with rounded or coded numbers especially in analysis of variance; Inequations for extreme values and other ranks applied to biometric problems; On hereditary differences between growth curves; Tolerance limits for KJ content in iodinated salt.

The editors are: Prof. Dr. O. Heinisch, Leipzig, and Prof. Dr. M. P. Geppert, Bad Nauheim. Each annual volume contains 296 pages and appears in four issues.

Publisher: Akademie-Verlag, GmbH, Berlin W 1. *Biometrische Zeitschrift* costs DM 36 per annum or DM 9 per separate issue.

—The Editors, *Biometrische Zeitschrift*

ARGENTINA

The General Bureau of Agricultural Economy, under their program for publication of information useful to agricultural sectors and those related to economic development, initiated a new publication series in January 1959 under the title *Boletín de Estadística y Economía Agropecuaria*. The bulletin appears bimonthly with data presented for each month under the following general sections: Agricultural statistics, livestock statistics, and agricultural economy.

—Inter American Statistical Institute

CHINA

Papers on probability and mathematical statistics, published in 1959 in two Chinese journals, are listed below. *Science Record* is a monthly journal published by Science Press, Peking, containing summaries of papers in various fields of science, in Western languages (chiefly English, with a few in Russian, in 1959). *Acta Mathematica Sinica* is a quarterly, published by the Academia Sinica containing papers in Chinese, with brief abstracts in Western languages.

Science Record, Volume 3 (1959):

A remark on the fundamental theorem in the theory of games, Wu Wen-tsün. No. 6 (June), pp. 229-233.

On a birth and death process, Wang Tzu-kwen. No. 8 (August), pp. 331-334.

On the regular and singular stationary generalized stochastic processes, Cheng Shaw-lian. No. 8 (August), pp. 352-358.

The uniqueness and nonuniqueness of the triangular association schemes, Chang Li-chien. No. 12 (December), pp. 604-613.

On the problem M/M/s in the theory of queues, M. I. Yüh. No. 12 (December), pp. 614-615.

Acta Mathematica Sinica, Volume 9 (1959):

Une remarque sur l'espérance conditionnelle II [no abstract], Yang Tsung-pan. No. 3, pp. 330-332.

On the problem M/M/n in the theory of queues, M. I. Yüh. No. 4, pp. 494-502.

CZECHOSLOVAKIA

A new journal of demography, entitled *Demografie*, is being published by the Czechoslovakian Central Bureau of Statistics. The first volume of the new quarterly appeared in 1959.

—*Statisticky Obzor*, Prague

HUNGARY

A Statistics Section was formed within the Hungarian Economic Society in December 1959. The Section has agreed upon its working program and has elected working committees. The Head of the section is Ottó Lukács, and Dr. László Lengyel is secretary.

—*Statisztikai Szemle*, Budapest

NETHERLANDS

"Order and Disorder in Statistics" was the theme of the fifteenth annual "Statistical Day" meetings of the Statistical Society of the Netherlands, held on March 15, 1960, at Scheveningen. Two speakers, Professor H. Freudenthal of Utrecht and Professor J. L. van Soest of Delft, addressed themselves to this theme at a general session in the morning.

Papers were presented at meetings of the sections of the society during the afternoon by A. H. Hulshof and R. B. Harteveld (Operations Research), A. P. Barten and P. Schmidt (Economic Statistics), J. I. de Bruijne and A. R. Bloemena (jointly) and E. H. Scheijde (Medical-Biological), O. ten Have (Descriptive Statistics), A. J. Stam and A. R. Bloemena (Mathematical Statistics).

—Statistical Society, Rotterdam

RUMANIA

The Societatea de Stinte Economice din R.P.R. **(Economics Society of the Rumanian People's**

Republic) was founded on September 29, 1959. The Society includes two sections: Statistics, and Economics, the latter having subsections for Industrial Economics and Agricultural Economics.

The Society announces as its main purpose the advancement of research in economics in Rumania and the development of scientific relations between the economists and statisticians of the R.P.R. and those in other countries.

The Society issues two publications: *Economic Problems* and *The Statistical Review*. The President of the Economics Society of the R.P.R. is Academician Al. Bîrlădeanu, and the General Secretary is Professor M. Levente.

—Economics Society of the R.P.R., Bucarest

SWEDEN

A conference on **Problems of Optimum Sampling in the Plane and Higher Dimensional Spaces** was held at the Institutet Forsakringsmatematik och Matematisk Statistik of the University of Stockholm, November 2-6, 1959.

The conference was opened wih a review paper by G. Ekman (Stockholm). The program included papers by S. Zubrzycki (Wroclav), J. Hajek (Prague), Bertil Matern (Stockholm), A. Rényi (Budapest), and B. Ajne (Stockholm).

—Dr. Leo Katz
Office of Naval Research, London

USSR

The **Second Conference on the Application of Mathematical Methods in Biology** was held May 18-23, 1959, at Leningrad University. There were thirty-five papers, some of which are summarized in *Teoriia Veroiatnostei i ee Primeneniia*, Vol. 5 (1960), No. 1, pp. 134-136.

Among the papers were the following:

On some developments in probability theory, directly related to problems in biology and medicine, B. V. Gnedenko.

Some statistical problems of the diagnosis of heart disease, M. A. Kulikov.

The role of statistical methods in anthropology, especially as applied to problems of economics, M. V. Ignat'ev.

The amount of phenotypic information, and the rate of natural selection, L. I. Shmal'gauzen.

Other speakers included Iu. V. Linnik, A. A. Liubishchev, A. V. Morozov, V. S. Smirnov (on various questions relating to estimating the size of animal populations); B. S. Bessmertnyi (mathematical models of epidemics); I. A. Nechaev (probit analysis); A. A. Penkovich (analysis of variance); and P. V. Terent'ev. Professor Terent'ev was chairman of the organizing committee for the conference.

—Teoriia Veroiatnostei
i ee Primeneniia
Moscow

A. Ia. Khinchin died on November 18, 1959, at the age of 65. He had studied and taught at the University of Moscow and in the V. A. Steklov Mathematical Institute. In 1939, Professor Khinchin was elected a corresponding member of the Academy of Sciences of the USSR. A review of his fundamental work in probability theory was published in *Teoriia Veroiatnostei*, Vol. 5 (1960), No. 1.

UNITED KINGDOM

The **Royal Statistical Society** held seven Ordinary Meetings and four Research Methods Meetings during the 1959-60 session.

Ordinary Meetings:

1. Practical experimentation as a teaching method in statistics. G. H. Jowett and H. M. Davies. November 18.
2. Statistics as a tool of management. Sir Hugh Beaver. December 16.
3. Statistics of the transport of goods by road. K. F. Glover. January 20.
4. The structure of the English milk industry. E. Strauss. February 24.
5. Economics of building designs. P. A. Stone. March 16.
6. The present position of econometrics. A Discussion opened by Mrs. Joan Robinson, Mr. J. S. Downie and Mr. C. B. Winsten. April 27.
7. Decision making in the steel industry. K. D. Tocher and A. Muir. May 15.

Research Methods Meetings:

1. On selecting the largest of k normal population means. C. W. Dunnett. October 7.
2. Confidence regions in non-linear estimation. E. M. L. Beale. December 2.
3. Models in the analysis of variance. R. L. Plackett. February 3.
4. Discrete stochastic processes in population genetics. W. F. Bodmer. April 6.

—Royal Statistical Society, London

The **Manchester Statistical Society** held five Ordinary Meetings during the 1958-59 session, at which the following papers were presented.

1. The Changing Balance of Fuel and Power. Mr. C. I. K. Forster (November 12, 1958).
2. Post-War Agricultural Policy in the United Kingdom. Mr. W. J. Thomas (December 10, 1958).
3. The Development of Mechanical Sorting in the Post-Office. Bridgadier K. S. Holmes (January 14, 1959).
4. Investment in the Nationalized Industries. Mr. S. R. Dennison (February 11, 1959).
5. The International Liquidity Problem. Mr. A. C. L. Day (March 11, 1959).

These papers have been published in the Society's *Transactions* for the 1958-59 session. Also published in the *Transactions* are summaries of papers presented before the Industrial Group and the Group for the Study of Economic Statistics.

—*Transactions of the Manchester Statistical Society*

A half-day **Conference on Sampling Inspection** was held at the Royal College of Science on February 9, under the sponsorship of the Imperial College-Birkbeck College joint statistics seminar. Under discussion were a number of new approaches designed to meet the objections of critics of systems in current use. The program follows:

The compound hypergeometric distribution and a system of single-sampling-inspection plans based on prior distributions and costs, Anders Hald (Copenhagen).

Some remarks on the Bayesian solution of the single-sample-inspection scheme, G. B. Wetherill (London).

Serial sampling acceptance schemes derived from Bayes' Theorem, D. R. Cox (London).

Flexible sampling—a new approach to inspection, G. A. Barnard (London).

—Dr. Leo Katz
Office of Naval Research, London

FEDERAL STATISTICAL ACTIVITIES

"Health, Education, and Welfare Trends"

The 1960 Edition of 'Health, Education, and Welfare Trends" was issued recently by the Office of the Secretary, Department of Health, Education and Welfare. This volume is the product of several years of experimentation in analyzing and presenting information for executive use. It is made available to the public this year for the first time in response to the numerous requests from individuals and organizations with policy, program, research, and informational interests and responsibilities in these fields.

The purpose of this publication is to aid in the understanding of national developments in health, education, and welfare and to help in analyzing the current and emerging problems. Each of the volume's 90 pages includes a brief text, a graph highlighting major developments, supporting tabular data, and notes sufficient to guide the reader to the basic sources for additional detail and methodology.

"Health, Education, and Welfare Trends" is a pioneer effort in bringing together for convenient reference social data on many subjects. It is designed to establish significant relationships in the field of the Nation's human resources. The volume is divided into five subject groupings covering such information as: *Background* Social and Economic Trends—vital statistics, income, prices, labor force, nutrition, Governmental finances, grants-in-aid, research and development; *Health*—illness, medical care, manpower, facilities, mental health; *Education*—enrollments, attainment, staffing, salaries, facilities, financing; *Welfare*—social insurance, public assistance, expenditures, child health and welfare, credit unions; and *Vocational Rehabilitation*—rehabilitants, economic contribution.

A large number of sources, both governmental and nongovernmental, were employed in preparing this edition. Extensive use was made of statistical series originating in the operating agencies of the Department of Health, Education, and Welfare—the Public Health Service, Food and Drug Administration, Office of Education, Social Security Administration, and the Office of Vocational Rehabilitation. Background data on social and economic subjects were provided by the Departments of Commerce, Labor, Treasury and Agriculture, and by other Federal agencies. Additional information was supplied by several private organizations.

Copies of "Health, Education, and Welfare Trends," 1960 Edition, may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 50 cents per copy

—Luther Stringham,
Acting Deputy Assistant to the Secretary for Program Analysis,
Department of Health, Education and Welfare

New Seasonal Adjustment Factors for Labor Force Series

Revised seasonal adjustment factors for the major series derived from the Monthly Report on the Labor Force were introduced in March, with the publication of data for February 1960. Seasonal adjustment factors for unemployment were first published officially in January 1955 and have been updated periodically since that time. The factors for the major labor force components which have been in use since January 1958 were based on the analysis of seasonal trends for the period 1947 to 1957. The present revision is based on an analysis which also includes data for 1958 and part of 1959.

The procedures used to derive seasonal factors have been changed to reduce the sensitivity of results to the addition of current data at the end of the series. The new procedure, while based fundamentally on a ratio-to-moving average approach as before, differs from the former method in three important respects: (1) there is a direct procedure for progressively modifying the estimates of trend-cycle in order to separate the underlying trend of the series from the seasonal and irregular components; (2) less weight is given to end values in deriving seasonal factors for terminal years; (3) a different method is used for detecting and dealing with outliers (extreme or unusual values). A detailed description of the methods used in the current revision is in preparation and will be issued by BLS later this year.

As a convenience, BLS has issued revised seasonally adjusted data on unemployment levels and rates back to 1947, based on the new definitions adopted in 1957. Seasonal adjustment factors to be used in 1960 for the major series are shown in the March issue of Employment and Earnings. Revised seasonally adjusted series for other major labor force components, which are not much affected by the change in procedure, are available now on request and will be published as soon as possible, together with factors for earlier years. This publication, which will include the detailed description of the methods used in the current revision, will replace the Bureau of the Census report, Seasonal Variations in the Labor Force, Employment, and Unemployment, Series P-50, No. 82.

Because seasonal patterns tend to change over time, the seasonal adjustment factors will be recomputed and reviewed at regular intervals, incorporating later data. In addition, research is continuing on ways of improving the seasonal adjustment methods. There is a question as to whether the present method of adjusting totals is entirely satisfactory during periods of recession. There is also some difficulty in preparing seasonal factors in advance which adequately adjust in early summer months for the large and increasing numbers of youngsters who are entering the labor force each year. One of the

techniques under investigation is the adjustment of the series by age-sex components instead of direct adjustment of the total. Preliminary results indicate that this approach may lead to improved results.

—Gertrude Bancroft,
Division of Manpower and Employment Statistics
Bureau of Labor Statistics

House Committee Report on Federal Data Compilation

A report on "Data Compilation Activities of the Federal Government: Personnel and Contract Costs" was released early in March, as House Report No. 1357. The report was prepared by the Subcommittee on Census and Government Statistics of the House Committee on Post Office and Civil Service. The Chairman of this Subcommittee is Congressman John Lesinski, Michigan. The report is based on an extensive survey of Federal departments and independent regulatory and administrative agencies made last year by the Subcommittee.

The report estimates that, as of June 30, 1959, Federal expenditures for data compilation and related collection, analysis, and publication activities totaled approximately $79 million. This total includes annual salaries of more than $60 million for the 11,171 Federal employees engaged in these activities; an average yearly cost of more than $2 million for outside contracts negotiated for statistical services; and an estimated additional $16.5 million for direct costs other than salaries.

Number of personnel and salary costs are summarized by department and agency and analyzed by primary organization unit within each department. About 87 percent of all personnel and annual salary costs reported by the executive departments is accounted for by nine of these primary organization units—Bureau of the Census, Agricultural Marketing Service, Bureau of Labor Statistics, Public Health Service, Social Security Administration, Agricultural Research Service, Internal Revenue Service, Bureau of Mines, and Office of Business Economics.

Contracts for statistical services let during a five-year period ending June 30, 1959, are summarized by department and agency and also by three types of contractors—private, State and local governmental units, and educational institutions. As an appendix, the report contains a listing of contracts awarded, showing the names of the contractors, payments stipulated, and brief descriptions of the purposes and results achieved for each contract.

Single copies of the report may be obtained from the Subcommittee on Census and Government Statistics, House Committee on Post Office and Civil Service, Washington 25, D. C.

—M. Douglas Fahey,
House Committee on Post Office and Civil Service,
U. S. Congress

New Reference Base Period for Federal Index Numbers

The establishment of the three-year period 1957-59 as the standard reference base period for Federal Government general-purpose index numbers was announced by the Bureau of the Budget in Circular No. A-28 of May 10, 1960. Conversion to the new base is to commence with the January 1962 indexes where feasible.

An attachment to the Circular lists several supplementary recommendations relative to the conversion, as follows:

1. To the extent that special circumstances make it impracticable to convert to the 1957-59 base period with the issuance of January 1962 indexes, every effort should be made to adopt the new base as soon thereafter as possible.

2. Conversion of each index should be carried back to the beginning of the index if possible.

3. While the weight base period for an index should be as close as possible to the reference base period, they will not necessarily coincide. Any discrepancy between reference and weight base periods should be indicated by appropriate annotation.

4. In accordance with an earlier recommendation on good practice for the publication of statistical data (*Standards for the Publication of Statistical Data*, Division of Statistical Standards, Bureau of the Budget, June 16, 1947) a full explanation of the techniques employed in making the revision should be prepared for public distribution. The first release of each index series should include a non-technical explanation, and a detailed explanation for the use of technicians should be available on request.

It has been government practice to establish a standard reference base for use by Federal agencies, subject to revision approximately every ten years. The base period 1935-39 was established in 1940, and the period 1947-49 in 1951. The new base was designated after consultation by the Office of Statistical Standards, Bureau of the Budget, with the statistical agencies and with nongovernmental statisticians.

—Edward T. Crowder,
Office of Statistical Standards
Bureau of the Budget

Among Recent Publications—

1958 Census of Business—Retail Trade (State of ——), issued by the Bureau of the Census. Series of final reports from the 1958 Census of Business for each of the 50 States, the District of Columbia, Guam and the Virgin Islands. Each report shows summary data for the state and for each standard metropolitan statistical area within the state on establishments, sales, payroll and personnel for about 95 kinds of business. The same statistics, with less kind-of-business detail, are also presented for counties and for cities with 500 or more retail establishments. In addition, a table shows for each county and each city with 2500 or more inhabitants, for total

retail trade, the summary statistics described above as as well as statistics on total number of establishments and total sales for each of eleven major kind-of-business groups. Selected comparative 1954 Census information is also included.

Available at varying prices from Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., or from field offices of the U. S. Department of Commerce.

1958 Census of Manufactures—Industry and Product Reports (———— Industry), and *Area Reports* (State of ————), issued by the Bureau of the Census. Preliminary reports, issued in industry report series, area report series, and two summary reports. Industry reports present area data for approximately 390 4-digit industries, showing figures on total employment and payroll, number of production workers, man-hours worked, value added by manufacture, cost of materials, value of shipments, and new capital expenditures. Reports include full product detail for approximately 7,000 commodities. Area reports for each state provide general statistics (employment, payroll, value added, etc.) by selected 2-digit major industry groups for the state and for standard metropolitan statistical areas, and for most counties on an "all manufacturing" basis. The summary reports are: "General Statistics for the United States by Industry Group and Industry: 1958 and 1954," and "General Statistics for the United States by Geographic Divisions and States: 1958 and 1954."

Available at ten cents each for individual industry and area reports, 50 cents for the summary reports, $35 for the complete set of industry reports and $4 for the complete set of area reports, from the Bureau of the Census, Washington 25, D. C., or from field offices of the U. S. Department of Commerce.

1958 Census of Mineral Industries—Industry and Product Reports; also two Summary Reports, issued by the Bureau of the Census. Preliminary reports. Industry Reports Series includes about 45 reports for specified mineral industries, with figures for a number of establishments; number of employees; payrolls; value added in mining; cost of supplies; purchased electric energy and subcontract work; cost of purchased machinery installed; receipts; and capital expenditures. Most reports contain general statistics for geographic divsions and states where the industry is important, as well as product detail. The summary reports are "Summary Statistics: Industry Groups and Industries," and "Summary Statistics: Geographic Divisions and States."

Available at 10 cents each ($4.00 for the entire set) from the Bureau of the Census, Washington 25, D. C., or from field offices of the U. S. Department of Commerce.

Forecast of Airline Passenger Traffic in the United States: 1959-1965, issued by the Civil Aeronautics Board. First of a series of technical Staff Research Reports on air transport economics in the jet age to be issued from time to time by the CAB, through its Office of Carrier Accounts and Statistics. Available on request from the Publications Section, Civil Aeronautics Board, Washington 25, D. C.

Health Statistics from the U. S. National Health Survey, issued by the Public Health Service, Department of Health, Education, and Welfare. Additional report in Series B (results from household interviewing, by topic):

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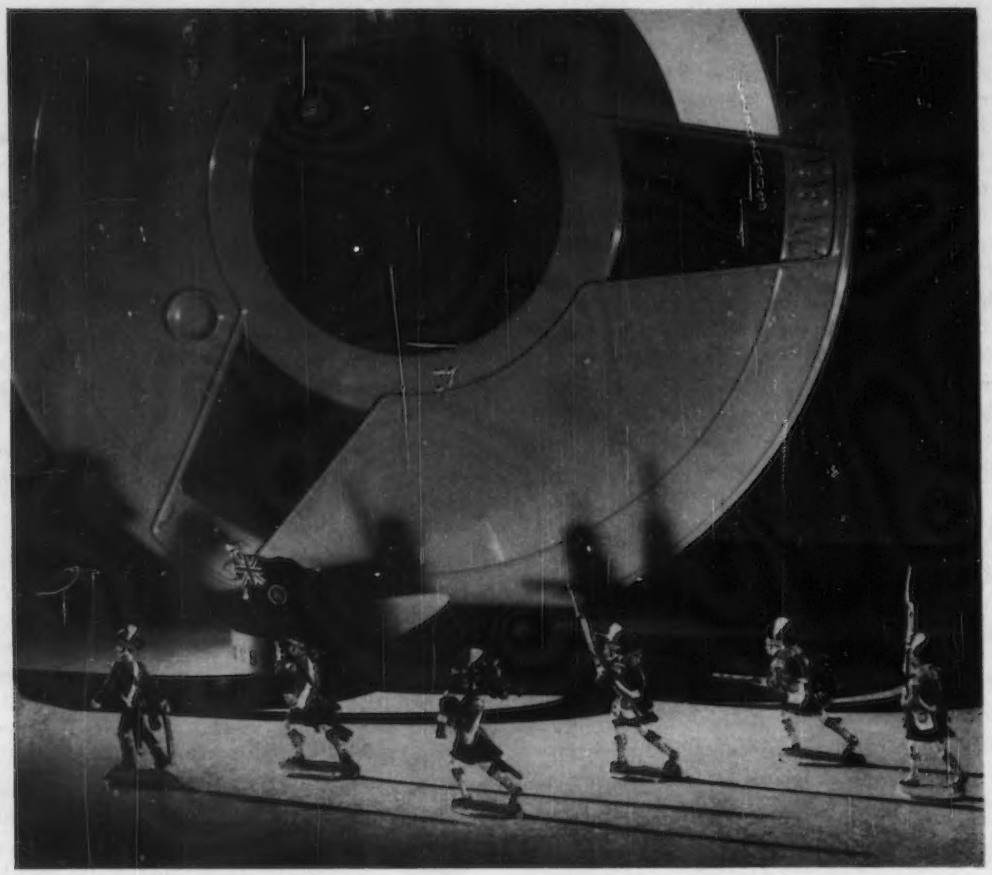

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THREE PAPERS IN HONOR OF HAROLD HOTELLING AT 65

Preface by Ernest Rubin

From the standpoint of the broadest development of statistics in the United States since World War I, the contributions of Harold Hotelling can be characterized succinctly by the words outstanding, many and unique. The papers that follow are modest tributes to Professor Hotelling as a teacher and as a creative mind in statistics and economics.

Professor Hotelling is a man of wide vision and of catholic interests. More than twenty years ago, while still at Columbia University, he sought to have the language requirements for the doctorate degree modified; he would have allowed Russian to be offered as a qualifying language coequal with French or German, by graduate students who were majoring in mathematical statistics. Today, not only Columbia University but other graduate schools in the United States have adopted Hotelling's suggestion on this language requirement.

Hotelling has expressed the thought that when, in the early nineteenth century, Latin was displaced as the language of science and mathematics, the progress of knowledge was adversely affected because the universality of communication was sacrificed. He strongly believes that the free flow of ideas, transcending political boundaries, is essential to the growth of all genuine thought. He is also of the opinion that constructive criticism, rather than vituperation or facile praise, is necessary for the sound development of statistics.

Brief reference must be made to some of Professor Hotelling's accomplishments and activities in the field of international statistics. He has lectured on statistics in France, Germany, Italy, Sweden, Canada, and more extensively in India and England. His association with international statisticians and econometricians has helped make the United States a center of contemporary statistical research and practice.

In the bleak decade of the 1930's, Hotelling assisted various refugee scholars of Central Europe who had fled from imminent oblivion to the United States; it is perhaps sufficient to mention only the late Abraham Wald. Since World War II he has invited a number of scholars from England, Germany, Japan, and especially India, to study and to teach mathematical statistics in this country.

In addition to teaching, writing and the activities already described, Professor Hotelling has served on the editorial board of the Annals of Mathematical Statistics. He is a former president of the Institute of Mathematical Statistics and of the Econometric Society, and vice-president of the American Statistical Association. Since 1941 he has been on the Board of Editors of the American Journal of Economics and Sociology.

During World War II he was actively engaged in statistical work of a military character and in that connection organized the Statistics Research Group at Columbia University. He joined the faculty of the University of North Carolina after the war where he is currently Professor of Statistics. It is pleasant to observe that Hotelling continues to pursue his statistical activities and interests with his characteristic vigor and rigor.

In organizing this symposium I was fortunate in obtaining the advice of Professor Gertrude Cox. The following papers were especially prepared, by invitation, for this issue. I wish to express my thanks to Professor T. W. Anderson of Columbia University, Professor W. G. Madow of the Stanford Research Institute, and Professor P. A. Samuelson of the Massachusetts Institute of Technology, for their very able and conscientious contributions and for their excellent cooperation.

HAROLD HOTELLING AS A TEACHER

by *William G. Madow*

Introduction

To view a man as a teacher, one often begins by listing his students and their work. Harold Hotelling has had many students. They have contributed much to the theory and practice of statistics. Today, his students' students are increasingly active in all parts of statistics.

In this paper, we are concerned with Hotelling's qualities as a teacher, qualities that have helped his students to be productive. We are also interested in his thoughts on how statistics should be taught, for his ideas have influenced greatly the teaching of statistics throughout our country. These are the subjects of the following two sections.

The Teacher in Class and With His Students

Hotelling is a good formal teacher. The subject matter is discriminatingly chosen, not only to present the current state of the subject matter, but also to enable the student to go on. The presentation is well organized; it is not haphazard, nor is it a dull, step-by-step statement. Exercises are given. The place of the subject matter in the history of statistics is recognized and discussed. The courses are not easy, but also the student doesn't think they are unnecessarily hard.

In his courses, one is always aware that Hotelling is a researcher. This shows up to some extent in the continued revision of subject matter taught. But it shows up even more in the appreciation of research that pervades his every moment. He does research. He welcomes the research of others. For him, research is not only the solution of hard technical problems, it is also the seeing of the problems. Research is a creative artistic activity. Every aspect of research is highly valued. Every aspect of the problem area must be considered.

The appreciation of research is accompanied by the appreciation of the student. Many students become aware and, perhaps for the first time, begin to believe that they too may be research workers. They are encouraged to try their hands at stating and attacking small, but unsolved, problems. They are early encouraged to read research papers. They are continually given the feeling that while it is not easy to be a research worker, it is wonderful to be one and it is possible that each can be one.

These attitudes emerge not only in class, but also in conferences with the students. Hotelling is almost always available to his students. Discussion lasts quite a while and the student often leaves wondering how Hotelling could believe that the student was following the discussion. But the central fact is that the student knows Hotelling did believe in the student. There is never any disparagement or criticism of the student. How could there be when there shines through every relationship with the student an appreciation of the dignity and capability of the student and of the interests of the student?

A student of Hotelling's is always aware of both the theory and the practice of statistics. Hotelling has consulted in many areas of application. These activities have led to the inclusion of realistic applied problems in his courses. Research in applied statistics is highly valued just as is research in theoretical statistics, but the young statistical research worker must keep in mind that the time taken for application is taken from theory. The emphasis in applications is in the unification as far as possible of the applied and theoretical problem. One does not stretch the applied problem to make it conform to a theoretical model, or use an unnecessarily complicated model. Equally, one does not refuse to consider an applied problem because no satisfactory theoretical model can be stated. But, the statistician does not automatically accept the statistical evaluation of the applied problem made by the person with whom the statistician is consulting. That statistical evaluation should be jointly made.

In attending Hotelling's classes, one early realizes the importance of mathematics to the statistician, especially the statistician who hopes to remain up to date. Mathematics should be sufficiently well known to be used freely. Not only first year graduate mathematics, but also second year and higher level graduate mathematics should be studied by the person working towards a doctorate in theoretical statistics. Mathematics is valued not only as a tool for statistics and a thing of beauty in itself, but also as required for the construction of mathematical models.

Thus, Hotelling's students early come to know the beauty and importance of research, both theoretical and applied. They become aware of their own dignity and value as people and research workers and of the opportunity that a statistician has to be helpful to others in many fields. They also become aware that statistics is a rapidly growing field, a field that steadily requires new levels of mathematical background and provides the means and ways of thinking needed for answering new questions. As should any statistician, they become specialists in scientific method.

Above all, they come to want to be statisticians, to do research, to teach, to apply and to consult, and to feel they can do it.

Many students who major in other fields take courses in mathematical statistics. Such students have always been welcomed by Hotelling. Their needs and problems are taken into account in classroom, although the majors in statistics are the primary concern in most courses. Ample opportunities are made available for discussion outside the classroom.

The Teacher in the College or University

Hotelling's ideas on the teaching of statistics and the place of statistics in a university were published in two papers (1, 2) given in 1940 and 1945. It is interesting to review these papers in relation to statistical education today.

The questions Hotelling asked in 1940 are no longer surprising in 1960, but they are still being asked.

"The growing need, demand, and opportunity have confronted the educational system of the country with a series of problems regarding the teaching of statistics. Should statistics be taught in the department of agriculture, anthropology, astronomy, biology, business, economics, education, engineering, medicine, physics, political science, psychology, or sociology, or in all these departments? Should its teaching be entrusted to the department of mathematics, or to a separate department of statistics, and in either of these cases should other departments be prohibited from offering duplicating courses in statistics, as they are often inclined to do? To what students, and at what stage of their advancement, should a course in statistics be administered? Should there be mathematical or other prerequisites? How much of an investment in a statistical laboratory is warranted? Should courses be primarily theoretical and mathematical, or should they be made as practical as possible, equipping the student in the shortest possible time for a job as statistician, or for statistical work in the field with which a particular department is concerned? What about degrees in statistics? Eclipsing all these in importance, though it seems to have received too little of the attention of college and university administrative officers is the question, 'What sort of persons should be appointed to teach statistics?'". (1), pp. 458, 459)

Certainly, today it is much more recognized than fifteen or twenty years ago that the teacher of general statistics should be primarily a statistician, at least to the extent of being a second major. One of Hotelling's comments of twenty years ago on this subject is especially relevant in view of the continuing attacks on Schools of Education.

"Qualifications of a good teacher of statistics include, first and foremost, a thorough knowledge of the subject. This statement seems trivial, but it has been ignored in such a way as to bring about the present unfortunate situation. Mathematicians and others, who deplore the tendency of Schools of Education to turn loose on the world teachers who have not specialized in the subjects they are to teach, would do well to consider their own tendency to entrust the teaching of statistics to persons who not only have not specialized in the subject, but have no sound knowledge of it whatever." ((1), p. 463)

It is unfortunately still true, in many colleges and universities that the teacher of a course in statistics may have little more knowledge of statistics than the introductory book he uses. A great improvement has occurred, and reasons to expect for ever increasing improvement will be given below.

There is a tendency to attack those who insist upon a thorough knowledge of statistics as a prerequisite for

teaching that subject as being unaware of the importance of a background in the area of application for teaching statistics to students in that area. Hotelling has stressed that courses dealing with the specific applications should be taught by specialists in the areas of application who have enough statistics to do so. Actually as time passes the importance of general ideas in introductory statistics courses increases. Introductory books and courses are much better than they were twenty years ago.

Still unsolved is the problem what to do about the content and teaching of the one-semester course having little or no mathematical prerequisite. This type of course is often required by departments in which statistics is applied. At present, these courses vary from courses in how to calculate standard statistical functions using a desk calculator to courses in which the basic ideas of statistical decision theory are presented.

It is a fact which cannot be permanently ignored that to introduce carefully the ideas of statistics requires most of the equivalent of a one-semester three hour course in statistics. Consequently, to require much about methods, as well as ideas, is to require more than can be done in such a course. On the other hand, a very good job could be done with a one year three hour course or its equivalent, especially if supplemented by a one-semester two hour weekly session on the uses of both desk calculators and electronic computers. Such a program would conform with Hotelling's suggestion that there be a first course in statistics to be taught to all; that course to be followed by another in which the applications would be stressed. The value and efficiency of such a program are so great that it should be seriously considered.

In view of the current stress on obtaining a sound mathematical education early in life, certainly no later than early college, let us note the following comment in one of Hotelling's papers.

"The possibilities of teaching quite advanced mathematics to young children have scarcely begun to be explored. Children of kindergarten age are fascinated and thrilled by the wonders of topology, and groups and number theory can be tremendous sensations in the fifth grade, though all these subjects are ordinarily reserved for graduate students specializing in mathematics. What is lacking is teachers who know mathematics and its applications and who possess enough freedom to teach what they know instead of the long, dull, and relatively useless drill on problems of wall-paper-hanging and the like, problems turning on mere conventions which are quickly forgotten—painful, repetitious work which makes children resolve to quit mathematics as soon as possible." ((2), p. 28)

The recent great growth of interest in mathematical models in the substantive fields is increasing both the demand for and quality of courses in statistics. Mathematical models are increasingly probabilistic and consequently, there has been a very noticable increase in the study of probability among non-mathematicians as well as statisticians. Simultaneously, the area of stochastic processes has been developing. The field of operations research also is leading to the increased study of probability and statistics.

It is worth pointing out in relation to introductory statistical teaching today that an increasing number of research workers in the substantive fields are concerned with mathematical models in those fields. They are often nowadays asked to teach the introductory statistics courses in their own departments. Whether or not they do as well in this activity as they might in other courses, there is no doubt that the quality of their teaching of statistics is much better than was the case when Hotelling's papers first appeared. Furthermore, they encourage their students to study mathematics and mathematical statistics.

Also, mathematicians are more interested than they were in applications in the social and biological sciences, and in operations research. Simultaneously with these developments are occurring improvements of courses in mathematics. Hotelling's students have been active in these areas.

Many contradictions can only be resolved in a larger framework than existed when the contradiction first appeared. This seems to be the case in the teaching of statistics. Although much remains to be done, the objectives of Hotelling's two papers are on the way to being achieved. The papers themselves are as cogent as when they were issued even though the situation has improved. They well merit careful reading, today.

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HAROLD HOTELLING'S RESEARCH IN STATISTICS

by *T. W. Anderson*

Harold Hotelling's publications include research in mathematics, mathematical economics, theoretical and applied statistics, discussion of education in statistics, some biographical sketches, book reviews, and other papers. From this work of wide scope I shall consider some of his contributions to mathematical statistics which seem to me of greatest importance and interest. These will be described and certain implications pointed out; however, I do not feel that here and now is the appropriate place and time for an attempt at a precise evaluation of his work. Since a complete bibliography of Professor Hotelling has been given elsewhere [1], I shall not include it here. About ten years ago in a discussion of R. A. Fisher's impact on statistics, Professor Hotelling wrote "these remarks lack many features of a good obituary notice, in addition to the

fact that the chief figure in them is still highly active and in the best of health." The same statement is applicable here.

Multivariate Statistical Analysis

The area of statistics that has received the most sustained and probably most significant efforts of Harold Hotelling is multivariate statistical analysis. In fact his name is associated with several methods and statistics. His first significant contribution has come to be called "Hotelling's Generalized T^2" [4]. Student's t for testing the hypothesis that the mean of a univariate normal distribution is a specified number μ_0 is

$$t=\sqrt{N}\,\frac{\bar{x}-\mu_0}{s}, \tag{1}$$

where $\bar{x}$ and s are the mean and standard deviation of a sample of size N. Under the null hypothesis this statistic has the familiar t-distribution. As is well known, for two samples $\bar{x}-\mu_0$ is replaced by $\bar{x}_1-\bar{x}_2$ and $s/\sqrt{N}$ is replaced by an estimate of the standard deviation of $\bar{x}_1-\bar{x}_2$; the result can be considered as a "distance" between the two samples. Now suppose that instead of one measurement on each individual we have several, say, $x_1, x_2,\ldots, x_p$, which may be considered to have a multivariate normal distribution. How do we test the null hypothesis that the p means are specified values, say, $\mu_{10}, \mu_{20},\ldots, \mu_{p0}$? It is desirable not to restrict the problem by requiring that the p variables be mutually uncorrelated (or independent). Professor Hotelling's solution to the problem was to propose a vector generalization of the square of (1), namely,

$$T^2=N\sum_{i,j=1}^{p} s^{ij}\,(\bar{x}_i-\mu_{i0})\,(\bar{x}_j-\mu_{j0}), \tag{2}$$

where $\bar{x}_i$ is the mean of the $i-th$ variable in the sample of N, s_{ij} is the sample covariance between the $i-th$ and $j-th$ variables (that is, $s_{ij}=s_i s_j r_{ij}$), and the set of s^{ij} are defined by $\sum_j s^{ij}s_{jk}=1$ if $i=k$ and 0 if $i\neq k$. The similarity of this statistic to t is more striking in vector notation. Let $\mu_0=(\mu_{i0})$ be the column vector of specified means, $\bar{x}=(\bar{x}_i)$ be the vector of sample means, and let $S^{-1}=(s^{ij})$ be the matrix inverse to the covariance matrix $S=(s_{ij})$. Then

$$T^2=N(\bar{x}-\mu_0)'\,S^{-1}(\bar{x}-\mu_0) \tag{3}$$

is Hotelling's multivariate analogue of t^2.

It is important that when the hypothesis is true T^2 has a distribution that does not depend on nuisance parameters (such as the population correlations between different variables), and this distribution is a well known one. Specifically, $(N-p)T^2/[p(N-1)]$ has an $F-$distribution with p and $N-p$ degrees of freedom. Professor Hotelling gave a geometric derivation of this which essentially showed that $T^2/(N-1)$ was the ratio of two variables with χ^2-distributions, and he derived its density.

In the two-sample problem $\bar{x}_i-\mu_{i0}$ is replaced by $\bar{x}_{i1}-\bar{x}_{i2}$ and Ns^{ij} is replaced by a similar quantity based on the two samples. This measure of the "distance" between two samples can be used for testing the hypothesis that the set of means of one population is the same as the set for the other population. Karl Pearson and V. Romanovsky had tried to set up "coefficients of racial likeness" to measure the distance between populations or to test the hypothesis of equality of means, but they did not use the covariances and hence did not come up with a measure with suitable statistical properties.

Essentially the same characteristic appeared in (presumably independent) publications later by Mahalanobis and his associates as the studentized D^2 and by Fisher in terms of discriminant functions. The scientific value of establishing priorities is probably always questionable (though popular); that certainly is not the purpose of this paper. In the field of multivariate analysis it has happened that the same theory has been discovered independently by as many as four or five investigators (a fact that has made workers in this field uncomfortable, to say the least).

One of the properties of T^2 that Hotelling observed was its invariance under linear transformations $x_i^*=\sum_j c_{ij}x_j$; in fact it was by way of seeking an invariant that he was led to T^2. This is of some interest because it was much later that a general theory of invariance was treated. A further advanced feature of the paper was a confidence region for the p means.

Another major development in multivariate analysis that is linked to the name of Harold Hotelling is *principal components* [6]. A number of statistical variates show concomitant variability; the question is what function of these measures shows greatest variability. The problem is made precise by asking for that linear combination $\sum\alpha_i x_i$ that has maximum variance with the coefficients normalized by $\sum\alpha_i^2=1$. The problem is to maximize $\sum\sigma_{ij}\alpha_i\alpha_j/\sum\alpha_i^2$. The solution is that the coefficients α_i satisfy

$$\sum_{j=1}^{p}\sigma_{ij}\alpha_j=\lambda\alpha_i, \tag{4}$$

where λ is the largest root of $|\sigma_{ij}-\lambda\delta_{ij}|=0$ ($\delta_{ij}=1$ and $\delta_{ij}=0$, $i\neq j$), σ_{ii} is the variance of x_i and σ_{ij} is the covariance of x_i and x_j; that is, the coefficients, say $\alpha_j^{(1)}$, compose the characteristic vector of (σ_{ij}) corresponding to the largest characteristic root. The linear combination $u_1=\sum\alpha_i^{(1)}x_i$ is called the first principal component (of $x_1,\ldots, x_p$ or of (σ_{ij})) and its variance is λ_1, the largest root. The linear combination uncorrelated with the first and having maximum variance is the second principal component and satisfies (4) with $\lambda=\lambda_2$, the second largest characteristic root of (σ_{ij}). This procedure may be continued to determine p principal components $u_1,\ldots, u_p$ as linear combinations of the observed variables $x_1,\ldots, x_p$; the observed variables can reciprocally be written as linear combinations of the components.

From one point of view the principal components form the most "natural" statistical coordinates. They are mutually uncorrelated and are ordered according to their variances. The variances λ_i and the weights $\alpha_j^{(i)}$ characterize the variance and covariance properties of the x_j. If some of the λ_i are quite small the corresponding u_i do not contribute much to the variability of the x_i; the statistician may feel that these can be ignored and in that case represents the original statistical variables as linear combinations of a smaller number of variables. It seems reasonable in exploratory studies, for example, where all measurements are made in the same units (such as anthropometric observations in centimeters) that only the linear combinations showing considerable variability are worth studying.

In some investigations there is no given unit of measurement for each variable. The unit may be statistically determined as the standard deviation. In effect this means that the covariance matrix is replaced by the correlation matrix. (In fact Hotelling's paper is written in these terms.) This situation arises frequently in analysis of batteries of intelligence tests. The analysis of such data based on linear models is called "factor analysis," and the method of principal components is one type of factor analysis.

Around the turn of the century Karl Pearson considered "the plane of closest fit." The distance of a point $(x_1,\ldots,x_p)$ from a plane $\sum\alpha_i\xi_i=c$ $(\sum\alpha_i^2=1)$ is $\sum\alpha_ix_i-c$. Minimization of the expected value of the square of the distance of a random point to the plane involves finding the linear combination $\sum\alpha_ix_i$ with minimum variance. The solution is the characteristic vector corresponding to the smallest root.

Professor Hotelling's contribution to this problem was not the fundamental algebra, for the algebra of characteristic roots and vectors and of minimization of quadratic forms had been worked out. His contribution was formulating precisely the idea of *component*, bringing to bear the mathematical knowledge, pointing out the implications, setting forth computational procedures, and discussing statistical inference. In reading Professor Hotelling's papers one cannot help being impressed by his thoroughness. His writings have literary and cultural qualities that seldom occur in the mathematical statistical literature. First Professor Hotelling motivates the reader by presenting the problem in terms of the statistical applications as well as in mathematical terms; he points out what previous work relates to the problem and what he intends to do. The mathematical steps are clearly stated. Then the significance (and possible shortcomings) of his results may be indicated and further problems pointed out. The reader is left with the impression that the author has thought carefully and thoroughly about the problem and has held back nothing important.

Another contribution in the same genre as that of principal components is that of canonical correlations [7]. Suppose the observable variables are divided into two subsets $x_1,\ldots,x_{p_1}$ and $x_{p_1+1},\ldots,x_p$, and we are interested in the interrelations between the two sets. A formal mathematical statistical problem is to find the linear combinations of the two sets of variables $\sum_{i=1}^{p_1}\alpha_ix_i$ and $\sum_{i=p_1+1}^{p}\gamma_ix_i$ which have the greatest correlation. For convenience the linear combinations can be normalized by requiring their variances to be unity. Then the coefficients satisfy

$$\begin{aligned} -\lambda\sum_{j=1}^{p_1}\sigma_{ij}\alpha_j+\sum_{k=p_1+1}^{p}\sigma_{ik}\lambda_k&=0,\\ \sum_{j=1}^{p_1}\sigma_{lj}\alpha_j-\lambda\sum_{k=p_1+1}^{p}\sigma_{lk}\lambda_k&=0, \end{aligned} \tag{5}$$

where λ is taken to be the largest value such that the determinant of the coefficients in (5) is 0. This value is then the maximum correlation $(\sum_{i,k}\alpha_i\sigma_{ik}\gamma_k)$. It is called the *first canonical correlation* and the corresponding linear functions $u_1=\sum\alpha_ix_i$ and $v_1=\sum\gamma_kx_k$ are called the *first canonical variates*.

We can next consider linear combinations of the first set uncorrelated with u_1 and linear combinations of the second set uncorrelated with v_1 and find the pair with maximum correlation. The coefficients satisfy (5) with λ taken to be the second largest value for which the determinant is 0. When the procedure is continued one obtains $u_1,\ldots,u_{p_1}$ as a set of linear combinations of $x_1,\ldots,x_{p_1}$, which are mutually uncorrelated, and $v_1,\ldots,v_{p-p_1}$ as a set of linear combinations of $x_{p_1+1},\ldots,x_p$, which are mutually uncorrelated, and such that each u_i is correlated with only the corresponding v_i. In effect the original variates have been referred to a new coordinate system which displays the correlation structure in the simplest possible way.

This kind of analysis may be useful in exploratory studies in which interest is focused on the relationship of two sets of variates (for example, intellectual and emotional factors). An investigator may only be interested in functions of one set that are reasonably well related to the functions in the other set. In such an instance the investigator may be satisfied with considering only those pairs of canonical variates with sufficiently great correlations. Professor Hotelling seems to have been led to this study by earlier consideration of "the most predictable criterion." The first canonical variate of one set is the linear function best predicted by the second set and the predicting linear combination is the first canonical variate of the second set. (Fisher and S. N. Roy followed other approaches to some similar results, presumably independent.)

One might say that the first sample quantity distinctive of multivariate analysis is the correlation coefficient proposed by Karl Pearson in the last century; it is also one of the first statistics for which the exact sampling distribution was derived (by R. A. Fisher). It is a little surprising then that rather recently

[9] Professor Hotelling published a paper of over 30 pages on the distribution of the correlation coefficient. Actually his work dates back to the thirties. Miss F. N. David, who did a tremendous amount of hard computing to bring out tables of the distribution in 1938, understandably "felt rather peevish" when she read this paper and found that Professor Hotelling had put the distribution in various forms, of which some lead to more efficient calculating methods than were previously available. On the other hand Professor Hotelling had indicated earlier his doubts about publishing his study because Miss David had published such complete tables.

Related to his work in multivariate analysis are his investigations on matrix calculations. For example, he proposed several new methods of matrix inversion, one an iterative procedure and another using partitioned matrices.

Various Areas of Statistical Research

Harold Hotelling's first three publications were in 1925, one in mathematics, one in mathematical economics and one in statistics. In the last he derived the density of the correlation ratio, which is equivalent to the density of the $F-$distribution. Another early paper dealt with differential equations having probability error terms; this was one of the first papers dealing with statistical problems of stochastic processes. Over the years Professor Hotelling dealt with a variety of statistical problems; in many instances he pioneered new developments. We shall consider in detail only a few of these.

A paper by Holbrook Working and Harold Hotelling [2] in 1929 on trends is interesting for presentation of one of the first examples of a confidence region. Consider a dependent variable y with regression function $\alpha+\beta\ (x-\bar{x})$. On the basis of a sample (with $\bar{x}$ as mean of the independent variables) we obtain estimates a and b of α and β, respectively, and an estimate $a+b\ (x-\bar{x})$ of the regression line. If the dependent variables are normally distributed, then a and b are independently normally distributed with means α and β, respectively, and variances σ_a^2 and σ_b^2, assumed known. It follows that

$$(6) \qquad \frac{(a-\alpha)^2}{\sigma_a^2}+\frac{(b-\beta)^2}{\sigma_b^2}$$

has a χ^2-distribution with two degrees of freedom. For a specified confidence coefficient this leads to a confidence region for α and β based on observed a and b. Now consider the set of all lines $y=\alpha+\beta\ (x-\bar{x})$ in the x, $y-$plane corresponding to (α,β) points in the confidence region. These lines fall between two hyperbolas; the set of lines is a confidence set for the regression line.

The authors did not state their confidence regions in a manner that we would consider clear and precise today. The regions were stated in terms of probabilities of the "true line" being within the hyperbolas; in a footnote they wrote that "this mode of speech is an ellipsis" and explained that the probability is associated with the estimated line. It was stated that this kind of interpretation holds for many other "probable error" statements; it is interesting that the explanation of confidence regions was introduced by the relatively sophisticated problem of a confidence region for lines (rather than points). The authors pointed out that if the variance of y is not known then σ_a^2 and σ_b^2 are replaced by estimates involving a factor s^2 and a multiple of the analogue of (6) has what we call an $F-$distribution. However, since the $F-$distribution was not then tabulated, they did not go into detail on this aspect.

Ever since Fisher wrote his extensive treatment of maximum likelihood estimates in 1922 there has been a stream of papers on the consistency and asymptotic normality of such estimates. Perhaps the first of these after Fisher was Professor Hotelling's [3] in 1930. It was an attempt to state precise conditions for consistency and asymptotic normality and give rigorous proofs of the theorems. This work came closer to a satisfactory mathematical treatment though it was not altogether successful. The paper is important in that the author stimulated further work which has gradually led to more general and exact treatment.

Other papers made early contributions to nonparametric statistics (asymptotic normality of the rank correlation coefficient), transformation of statistics (specifically the t), and prediction (choice of predictors). A study on the experimental determination of the maximum of a function published in 1941 [8] is particularly interesting because more recently a good deal of work has been done on such problems. Professor Hotelling proposed the problem of estimating the value of x maximizing an unknown function $f(x)$ when one can take a fixed number of observations on $y(x)$ having $f(x)$ as expected value and one can select the values of x at which $y(x)$ is observed. When the statistician has a rough idea of where the maximum is he can approximate $f(x)$ by a quadratic polynomial $\beta_0+\beta_1 x+\beta_2 x^2$ (the first terms of a Taylor series about a suitable origin), estimate the coefficients of the quadratic by the usual least squares estimates, say b_0, b_1, b_2, and use the value of x maximizing $b_0+b_1 x+b_2 x^2$ (that is, $x=-b_1/(2b_2)$ as the estimate of the value maximizing $f(x)$. Professor Hotelling studied the bias (introduced by the approximation and by use of the ratio as an estimate) and the sampling variability. He showed that certain conditions on the choice of the x's control the bias and he considered the choice of these x's to minimize the sampling variability. He also initiated an investigation into the case of two independent variables, and closed the paper by indicating unsolved problems.

In addition to his mathematical statistical investigations Professor Hotelling made some studies in applied statistics. One which is referred to in popular conversation (at least among statisticians) and which I find of special current interest, concerns duration of pregnancy [5] (with Floy Hotelling). The authors confirmed that the average duration of normal pregnancy is 280 days, but estimated the standard deviation at 11 days which

is a little greater than indicated by earlier studies. Among the conclusions are no significant differences in mean length or standard deviation between first and later pregnancies, no significant effect of age of mother, and greater variability "between mothers" than "within." This paper was probably the first application of modern statistical methods (such as analysis of variance) to these problems.

In concluding this brief review of some of Harold Hotelling's research in statistics, I want to congratulate him on his 65th birthday. I am sure the readers of this journal join me in wishing for him many more happy and productive years.

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HAROLD HOTELLING AS MATHEMATICAL ECONOMIST

by *Paul A. Samuelson*

Until quite recently the number of mathematical economists was not large. It might have been a relaxing hobby to collect all the first editions of the major works of Cournot, Jevons, Walras, Edgeworth, Wicksell, Irving Fisher, and Pareto—to say nothing of a dozen other minor writers in this vein such as Marshall, Auspitz and Lieben, Launhardt, and many others. Perhaps a careful observer might have been forgiven if in 1920 he had concluded that mathematical economics was a dead-end, and indeed dead, subject. For the original late nineteenth century spurt had largely spent itself before the first war.

The New Dawn

It was in 1925, when Harold Hotelling was almost thirty, that he burst on the scene of economics. Although he took his Bachelor's degree in journalism, Hotelling belongs to that small group of scholars who came into economics from formal training in mathematics; and to the subset of that group whom economists recognize as having made significant contributions to economics proper.

Besides Hotelling's many contributions to the valuable economics tool of mathematical statistics, he wrote more than twenty contributions to economics itself. No one of these is lacking in interest and insights, but it is for his six major papers, published between 1925 and 1938, that he will be most remembered by the historian of economic analysis. As economists of my generation can testify, late comers find it much easier to ride the crest of a renaissance after it has clearly gotten under way than to be one of the pioneers initiating that renaissance. Men like Hotelling, Frisch, and Tinbergen—to say nothing of Griffith C. Evans, Henry Schultz, and Charles F. Roos—were the leaders in the pre-1930 revival of mathematical economics.

Great Days on Morningside Heights

It was at Columbia, in the decade before World War II, that Hotelling became the Mecca toward whom the best young students of economics and mathematical statistics turned. Many of today's leading scholars went through an apprenticeship with him. Even less able students were accorded his legendary attentiveness to their problems, to the degree that some of their work appeared to outsiders to be more a tribute to Hotelling's originality than their own. And so kindly a Master was Hotelling as to make it hard to evaluate his glowing letters of recommendation and his liberal awarding of A grades. (This resemblance to Schumpeter was striking.)

All in all, the combination of Wesley Mitchell, J. M. Clark, and Harold Hotelling made Columbia an exciting place in the 1930's, carrying forward the great tradition of John Bates Clark and H. L. Moore. Alas, Hotelling's increasing preoccupation with mathematical statistics was that discipline's gain but a loss to the literature of economics. All the more worthwhile, therefore, for me to recall his six major papers in economics (1).

Depreciation and the New "Entropy" Economics

It is remarkable that Hotelling's first economic paper, dealing in 1925 with the thorny problem of depreciation, already shows, in addition to a firm mathematical technique, a keen understanding of the subtle economic aspects involved in the problem. From the very beginning, in good Irving Fisher fashion, he sets up the present discounted value of future net receipts and insists that every decision be taken so as to maximize this integral. Simple as this idea is, it puts a whole new light on the purpose of computing depreciation, and enables him quickly to set down the

derivative conditions for the determination of the optimal length of life for an asset that will not be replaced. Later writers, such as Gabriel Preinrich, Armen Alchian, and George Terborgh, generalized this problem to an infinite stream of succeeding machines.

We have here then a nice example of what has come to be known as managerial economics, and a particular example of the kind of dynamic programming Richard Bellman and others have studied in our own day. And it must be a gratification to Hotelling to know that all over the land business management is today using methods, developed by George Terborgh of the Machine and Allied Products Institute, to replace machines so as to maximize the firm's present discounted values.

The following quotations from this first paper (pp. 351-2) will show that from the beginning Hotelling realized the importance of maximizing principles to economics:

> . . . the guiding principle is that . . . discounted future profits, is to be made a maximum. Even if the capitalist system is to give way to one in which service and not profit shall be the object, there will still be an integral of anticipated utilities to be made a maximum. Since we must find a function which maximizes an integral we must in many cases use the Calculus of Variations. But the problem here transcends the questions of depreciation and useful life, and belongs to the dawning economic theory based on considerations of maximum and minimum which bears to the older theories the relations which the Hamiltonian dynamics and the thermodynamics of entropy bear to their predecessors . . .
>
> . . . A thorough working knowledge of the Calculus of Variations is a prerequisite to the development of this type of economic theory [the new "entropy" economics]—which doubtless explains why it has not developed further.
>
> All hedonistic and eudaemonistic ethical theories, which declare that the total of pleasure or happiness should be made a maximum, really reduce the question of right conduct to a set of problems in the Calculus of Variations and in the more general theory of maxima of functionals.

There is perhaps an overemphasis upon the calculus of variations and maximizing continuous functionals here, due no doubt to the coeval work of Evans and Roos and the many students of G. A. Bliss; and also to Hotelling's own developing interest in the problem of mining that was to be the subject of his third major paper, that of 1931 dealing with exhaustible resources and giving extremal conditions for various maxima. For the most part economists have found it just as convenient to work with a finite number of variables defined at many discrete periods of time as to deal directly with functionals. And except in connection with capital theory there have been rather few important applications of the calculus of variations in the thirty years that have since elapsed. (2) For all of that, there is a prophetic insight in these early words.

Location and Duopoly

The 1929 paper on "Stability of Equilibrium," which has been reprinted in the American Economic Association's *Readings in Price Theory*, is perhaps Hotelling's most widely known piece. Its happy example of sellers strung like beads along a road is not only of economic import but is interestingly used by Hotelling to show why our two major political parties tend to be so much alike and why cider tends to be too homogeneous. In the realm of location theory, it is a worthy successor to the special models of Thünen, Weber, and Fetter and a worthy forerunner of the Lösch-Christaller hexagonal patterns of two-dimensional location. Like most original investigations, it has been extensively commented on by later writers: e.g. E. H. Chamberlin in his revolutionary *Theory of Monopolistic Competition* (1st edition 1933; 7th edition 1957) and many others.

If quantity demanded of a good is the same at every point on a line-segment and independent of delivered price and if transporting a unit of the good costs a constant amount per unit distance, then social costs are minimized if a single seller locates in the middle of the line. The rational monopolist will in fact go to the central point. But suppose there are two sellers, each regarding the other's price as fixed and setting his own F.O.B. price to maximize his net profits. Then a seller will set his price so as to sell some output at home, and he can be sure of the market "behind him" (i.e., between him and the end of the line segment). As he lowers his F.O.B. price to all, even though the two goods are identical and the demand at each point on the line totally inelastic, he widens his own share of the line between him and his rival because the boundary of his market, the point of equal delivered price from the two sources, necessarily moves towards his rival. Thus, at prices which leave some market to the other fellow, each man's profit becomes a smooth function of his and his opponent's administered prices. The Hotelling-Bertrand point of duopoly equilibrium is then given by the two equations

$$\frac{\partial \pi_1(p_1,p_2)}{\partial p_1}=0, \qquad \frac{\partial \pi_2(p_1,p_2)}{\partial p_2}=0$$

Moreover, empirically one man would find his maximized profits increasing if he moved *toward* his stationary rival. So instead of locating at the social optimum point of $(\frac{1}{4}, \frac{3}{4})$ on a unit line, sellers may tend toward the middle point $(\frac{1}{2}-\epsilon, \frac{1}{2}+\epsilon)$. For $n>2$ sellers, the socially optimal locations $(\frac{1}{2^n}, \frac{3}{2^n}, \ldots, \frac{2n-1}{2^n})$ will not be reached; nevertheless whenever too great an empty space appears, it will pay one of the men to move into it. Interestingly enough, if we wind the line around a circle, we get rid of the certain market "behind" the outside men and may find an equally-spaced equilibrium.

Hotelling has built upon the earlier duopoly theories of Cournot, the French mathematician Bertrand, and Edgeworth. It will be recalled that Bertrand repudiated Cournot's market specification that each seller can only name his output and that total output is auctioned off to bring the price given by the demand curve $p_1 \equiv p_2 \equiv \ldots \equiv p = D(q_1+q_2+\ldots)$. Instead Bertrand as-

sumed a market structure in which each seller independently *names* his own administered price, p_i. With homogeneous goods, the demand relations for each Bertrand seller have infinite cross-elasticity and own-elasticity at $p_1=p_2$; so naturally this discontinuity can lead to continuous price undercutting down to zeroless cost, or to the common marginal cost of identical sellers. Because of transport cost, Hotelling's $\pi_i(p_1,p_2)$ functions were designed to avoid discontinuities and corners at $p_1=p_2$ and this gave him his "stability" of equilibrium.

However, as Bowley, Frisch, Edgeworth (in neglected passages), Stackelberg, and Neumann and Morgenstern have shown, the duopoly problem is the same in principle whether you write the demand functions as prices in terms of quantities or as quantities in terms of prices. Indeed, since a seller need not sell all that consumers want to buy at the named price, the strategy space for each one of the sellers may have to involve *both* his p_i and q_i. So generally the profits for each have to be written as the general payoff function $\pi_i(x_i,x_j)$, where the space of the strategy vectors x_i of man i have to be specified *institutionally*.

From this viewpoint, the Hotelling equilibrium point is the same in principle as the Cournot point, the Bertrand point, or the modern-day Nash equilibrium point for a non-constant sum game; namely, each of two or more rivals is supposed to pick his x_i strategy so as to end up with the system's achieving the following simultaneous maximum relationships

$$\underset{\{x_1\}}{\text{Max}}\ \pi_1(x_1,\bar{x}_2) \text{ and } \underset{\{x_2\}}{\text{Max}}\ \pi_2(\bar{x}_1,x_2),$$

where the barred magnitudes are subjectively taken as unalterably given.

Unless we have the special Neumann case where π_1 and π_2 add up to a constant (or can be made to do so by scale changes) there need not be a nice saddlepoint solution and all such proposed Nash solutions are open to numerous economic objections. Edgeworth, Bowley, and Stackelberg pointed out that if one seller picks x_1 to maximize π_1 taking x_2 as given, then the other can usually benefit from *not* pursuing a similar behavior pattern. Nor is it certain, except in a tautological sense, that collusively $\pi_1+\pi_2$ will be maximized—for the reason that there is no way a rational colluder can know in advance how the maximized total will end up being divided. Nor will economists wish to commit themselves to a different kind of Nash symmetry solution based on various appealing but arbitrary axioms.

Of course none of this commentary thirty years after the fact detracts from Hotelling's 1929 achievement.

Integrability and All That

Hotelling's 1932 article dealing with producer supply and demand conditions and taxation, his 1935 article dealing with demand by a consumer subject to a budget or income constraint, and his 1938 article on welfare marginal cost pricing are all part of a developing pattern. The 1932 preoccupation with the taxation paradox of Edgeworth well reveals the superiority of mathematics to commonsense reasoning where deductive intricacies are concerned. How can placing a unit tax on one or on two goods actually cause *both* prices to fall? Commonsense tells us, if we tame it, that after two such taxes a monopolist will definitely cut down on his output of at least one good (and he *may* cut down on the other one too). If demands were independent, then with at least one q certainly down at least one p would have to rise. (Giffen effects have been ruled out of order here.) But with interrelated demands, the reduction of one (or more) q_i cannot rule out the possibility that all p's might have to fall.

More important than this curiosity is the detailed analysis of interrelated supply and demand functions of profit maximizers. Hotelling for the first time rigorously derives correct integrability conditions and secondary definiteness conditions that each firm's functions must satisfy and that the *aggregate market* functions must satisfy. In connection with tax and optimality problems, Hotelling beautifully generalizes to related demands the Dupuit-Jenkin-Marshall concepts of consumer surplus and deduces important relations that are approximately true for small taxes. Later writers, such as Hicks, Allais of Paris and his students Boiteux and Debreu, and many others have built on this work of Hotelling. Without apparently knowing the Ramsey-Pigou taxation analysis of 1927, Hotelling poses and gives at least a formal solution to the problem of the optimal pattern of *excise* taxes to achieve a given amount of real revenue with least loss.

Here is a further point to illustrate the penetration of Hotelling's analytical power. The fact that prices as a function of quantities possess a symmetric and definite Jacobian matrix is shown to imply that the inverse functions of quantities in terms of prices must possess the same property. It follows that the integrability conditions have insured the existence of a new function, called by Hotelling a "price potential," whose second derivative symmetric Hessian matrix is identical to the relevant Jacobian matrix. Many later writers, such as Court, Roy, Hicks, Houthakker, and I have had occasion to make extensive use of such inverse or indirect utilities or potentials that were related to Legendre transformations and Gibbsian thermodynamic potentials.

To complete his 1932 program of taking into account demand generated by utility maximized *subject to an income restraint*, Hotelling in 1935 tackled the mathematics of this problem. He began unaware of Slutsky's brilliant 1915 Italian solution. Hicks and Allen and Henry Schultz too did not in the beginning know Slutsky's work, and Hotelling carried on his researches unaware of the Hicks and Allen 1934 conquest of this summit. Because of the simple fact that Harris Hancock had published a detailed account of Weierstrasse's little-known resolution of the secondary condition for a constrained maximum, Hotelling was able to do quickly what Pareto never in all his life succeeded in doing—namely to give the correct bordered-matrix

conditions sufficient for a true constrained maximum. This shows the importance of pure mathematical technique in an applied field. Pareto's instincts were perfect; his equipment just not up to his needs. (3)

Marginal Cost Pricing

I come now to the *piece de resistance*. The title of Hotelling's 1938 paper, "The General Welfare in Relation to Problems of Taxation and of Railway and Utility Rates," gives a good idea of its importance. Once the George Washington Bridge has been built and before it has become overcrowded, the social extra or marginal cost of having one more person cross on it is virtually nil. Why then charge a toll, causing some users to go by circuitous routes? It is not the transfer of money from citizen to the state that bothers Hotelling: after all there may be bond interest on the bridge that has to be paid; and it is possible that the user is rich and not especially to be spared unpleasant income effects. It is the citizens who needlessly avoid use of the bridge, and to that degree never pay any money, who are involved in the social problem of inefficiency in the use of resources—or what economists call "deadweight loss" from less than optimal taxation and pricing.

The conclusions of his analysis are sweeping: all industries which are subject to increasing returns (railroads, public utilities, etc.) ought to be charging the lower figure of marginal costs rather than average costs which will permit them to break even; all taxes, to subsidize the deficits of such industries and to provide revenues for desired real public services and for desired redistribution of income involved in various welfare transfer programs, ought to be levied in "lump sum" form so as to leave each person and firm facing market prices that truly reflect correct social costing and are not distorted by various tax excises so as to leave the system with deadweight loss. If this Hotelling-Lerner pattern is not followed, there always exists a rearrangement of society that can make every man better off—the rich, the poor, the worthy, and the unworthy; and if it is followed, there exist redistributions of income that will guarantee that a specified social welfare function for all of society has been truly made a maximum in terms of the technological alternatives open to society.

All this of course is grandly ideal. Hotelling shows in subsequent discussions that he realizes the feasibility compromises that would have to be met. None the less it is his strong empirical inference that if the glaring cases of divergences of price from marginal cost are dealt with that this will with great probability lead to a "better" configuration than if customary practices are followed; and he points up the presumption that, other things equal, small excises on many goods do less harm than a large excise on a few.

Hotelling points out that his general result is not new and can be traced back at least to the French engineer Dupuit and to a number of neoclassical economists (including, I may add, Wicksell who influenced Swedish economists early in this century to favor marginal cost pricing for railroads). But Hotelling, independently of Lerner, Bergson and other contemporaries, was the first to generalize the argument from a Marshallian partial equilibrium analysis of a single market to the rigorous analysis of n interrelated goods.

Because his analysis gave rise to some criticism and misunderstanding, I shall restate it briefly in slightly modified terms. For simplicity suppose society's production of n goods $(q_1,...,q_n)$ involve constant-returns-to-scale production functions in terms of a single primary factor L (standing for "labor" or "land"); hence, production possibilities are summarized by

$$\pi_1 q_1 + \pi_2 q_2 + \ldots + \pi_n q_n = L, \tag{1}$$

where the π's represent true social and private marginal costs (expressed in terms of the *numeraire* L).

Now suppose that a single individual wishes to maximize an ordinal utility indicator $\Phi(q_1,...,q_n; L)$. Alternatively Φ could be postulated to hold for each of a large number of identical persons, or could even represent a social welfare function derived after an ethical observer had arranged for optimal transfers that would keep the social marginal utilities of every man optimally equal.

In the absence of governmental services and taxes and changes in L, a technocrat would succeed in maximizing Φ by picking $(q_1^*,...,q_n^*)$ such that

$$\frac{\partial \Phi}{\partial q_i} = \lambda p_i; \tag{2}$$

together with (1), (2) determines the pre-tax optimum.

A competitive market system which set prices (relative to the wage) equal to marginal cost, $p_i = \pi_i$, and gave the man an income $m = \bar{L}$, would achieve the same optimum if the man used free choice in the market to maximize Φ subject to the income budget constraint $\sum p_i q_i = m$.

Now suppose the government requires goods for public purposes in amounts $(g_1,...,g_n)$, with $r = \sum \pi_i g_i$ the irreducible real tax burden. Then the technocrat would find a new optimum $(q_1^{**},...,q_n^{**})$ satisfying exactly the same equations as (2) but with the right hand expression in (1) now involving L minus the needed government expenditure or revenue r. Unless the public g's affected preferences among the private q's, presumably less would now be consumed of all "superior" goods; etc. To determine the optimal g's, equations of the form $\partial \Phi / \partial g_i = \lambda \pi_i$ would be necessary along the lines of my modernized Wicksell-Lindahl theory of public goods; but that was no concern of Hotelling in 1938.

What pricing system would be optimal? Hotelling shows that the new (q_i^{**}) can be reached by setting $p_i - \pi_i = t_i$, the size of each excise tax, in every case equal to zero; at the same time we must reduce income $m = L$ to $L - r$. Thus, an "income" tax is an optimal tax. Hotelling agrees with Lerner that if $\partial \Phi / \partial L \neq 0$, so that factor supply is variable, then a so-called income

tax is really an excise on effort and should really be required to be a "lump sum" tax independent of pre-tax income L. He agrees with R. F. Kahn and Frisch that p_i proportional to π_i in every case, rather than equal, may also be optimal provided L is strictly constant; with any possible variability in L, he has to insist upon full equality to marginal costs rather than mere proportionality. (4)

The Scientist as Man

Enough has been said to point up Hotelling's tremendous originality in dealing with deductive matters, and what is rarer among theorists his fruitful insights into important social and economic problems of modern society. In concluding I trust it will not be impertinent to draw attention to two of his important personality traits.

A mathematical economist need not be of any particular political persuasion. Despite Mussolini's decorating of Pareto, the old canard that "a reactionary is a man who believes in equilibrium" is not sustained by the history of mathematical economists. The dispersion of their views has pretty much matched that of their contemporaneous literary comrades, and if any statistically significant difference could be found it would probably be to the effect that the median mathematical economist has been slightly more in favor of reform than the total universe of economists.

Certainly Hotelling always indicated a strong concern for improving the workings of our economic system and decreasing its inequalities: thus, while showing his usual kindliness toward a sloppy book on economic time series, he could not pass over without protest its claim that the goodness of fit of a Pareto distribution to segments of data on wealth, billiard scores, and executive salaries implied society could not alter the distribution of wealth or could do so only at the cost of ensuing catastrophes like the French and Russian Revolutions or the collapse of the Maginot Line. And it is worthy of note that what is perhaps Hotelling's most important single paper, his 1938 Presidential Address to the Econometric Society which was commented on above, chose to deal with the welfare economics inefficiencies resulting from social pricing different from marginal costs.

Finally, one should mention Hotelling's sense of the importance of his kind of work. From the very beginning he had an optimistic faith in the urgency of applying mathematics to social problems and fostered in others the desire to cultivate this vineyard. In the dark days of World War II, at M.I.T. I heard him express in all seriousness the conviction that the Allies would surely win the conflict, because they had (in Britain, the United States, and India) the leading masters of modern statistical theory in contrast to Germany and Italy which had none. And I believe it was Hotelling who during that War suggested *Econometrica* be discontinued lest its contents lend aid to the Enemy's war effort! Such faith may to some appear to border on the naive. But the history of ideas shows that strong faith is the pioneer's greatest asset. And it is society's gain that Harold Hotelling is in this regard so generously endowed.

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(2) The work of Fred Westfield and of Tjalling Koopmans on optimal use of water in hydroelectric scheduling provides significant exceptions.

(3) The 1935 treatment is perhaps not completely satisfactory in its goal of deriving useful inequalities for *market* demand functions arising from aggregating many consumers. Instead of writing market demand as a homogeneous function of degree 0 in all p's and all specified individual incomes, m_a, Hotelling seems to replace implicitly $q_i = \Sigma_a q_{ia} = \Sigma_a h^{ia}(p_1,...,p_n,m_a) = q^i(p_1,...,P_n; m_1,...,m_a,...)$ by $q_i = f^i(p_1,...,p_n)$ or by their (existent?) inverse $p_i = F^i(q_1,...,q_n)$. I may say that my own attempt to do better in *Econometrica* 1938, I no longer like. Perhaps the root of Hotelling's difficulty is that his writings are never fully Walrasian; he improved on Marshall and Edgeworth by generalizing their partial equilibrium to many interrelated goods, but it was no part of his interest to spell out in print the full Walrasian general equilibrium and some of the minor misunderstanding of his 1938 paper may be due to this. As he was aware, a rigorous interpretation of his results was possible in the special case where for everyone the marginal utility of income, λ_a, was strictly constant—not a realistic case but one that does give partial equilibrium analysis a firm deductive base. Certainly Hotelling as much as any of his generation gave the stimulus, by his generalizing partial equilibrium, to the modern revival of full general equilibrium analysis.

(4) This is not the place to consider (1) how the effects of marginal social utilities of income of different men can be handled. Or (2) how Hotelling's use of differentials can be justified by a rigorous analysis of point derivatives. Or (3) how, as Margaret Joseph and others have shown, it is really the Slutsky elasticities and not the *ceteris paribus* $\partial q_i/\partial p_j$ expressions which are crucial in computing minimum deadweight loss. Years ago in a Treasury memo, I showed how the Ramsey analysis can be improved on, and Boiteux has published numerous important contributions to this problem. Suffice it to say that Hotelling's theorems can be defended from all criticisms, and form the springboard for an attack on the more difficult problem of what is the best compromise when all price and marginal costs cannot be equated for feasibility reasons.

Aerial view of San Francisco

1960 ANNUAL MEETING—August 23-26

Stanford University, Stanford, California

STANFORD UNIVERSITY is a private university founded in 1885 as a memorial to Leland Stanford, Junior. The university is basically a residence university with the majority of the 5,000 undergraduate students living on the campus and a significant number of the 3,000 graduate students also living in either special graduate dormitories or in subsidized housing units for families.

The University is centrally located in a region which can satisfy the most varied interests. San Francisco—noted for its historic past as well as its present-day art galleries, theaters, and other cosmopolitan attributes—is 30 miles to the north. This city is at the southern base of a vast and scenic area, known as the Redwood Empire, which stretches to the Oregon border. To the west of Stanford, across the forested Coast Range, is the Pacific Ocean; and to the southwest, along its pleasant beaches and rocky headlands, are the sea resorts of Santa Cruz, Monterey, Carmel, and Big Sur. The Mother Lode region and the spectacular Sierra Nevada lie to the east across the great Central Valley of California.

PARTICIPATING SOCIETIES

American Statistical Association; Biometric Society, ENAR and WNAR; Econometric Society; Institute of Mathematical Statistics; Western Economic Association; Western Farm Economics Association.

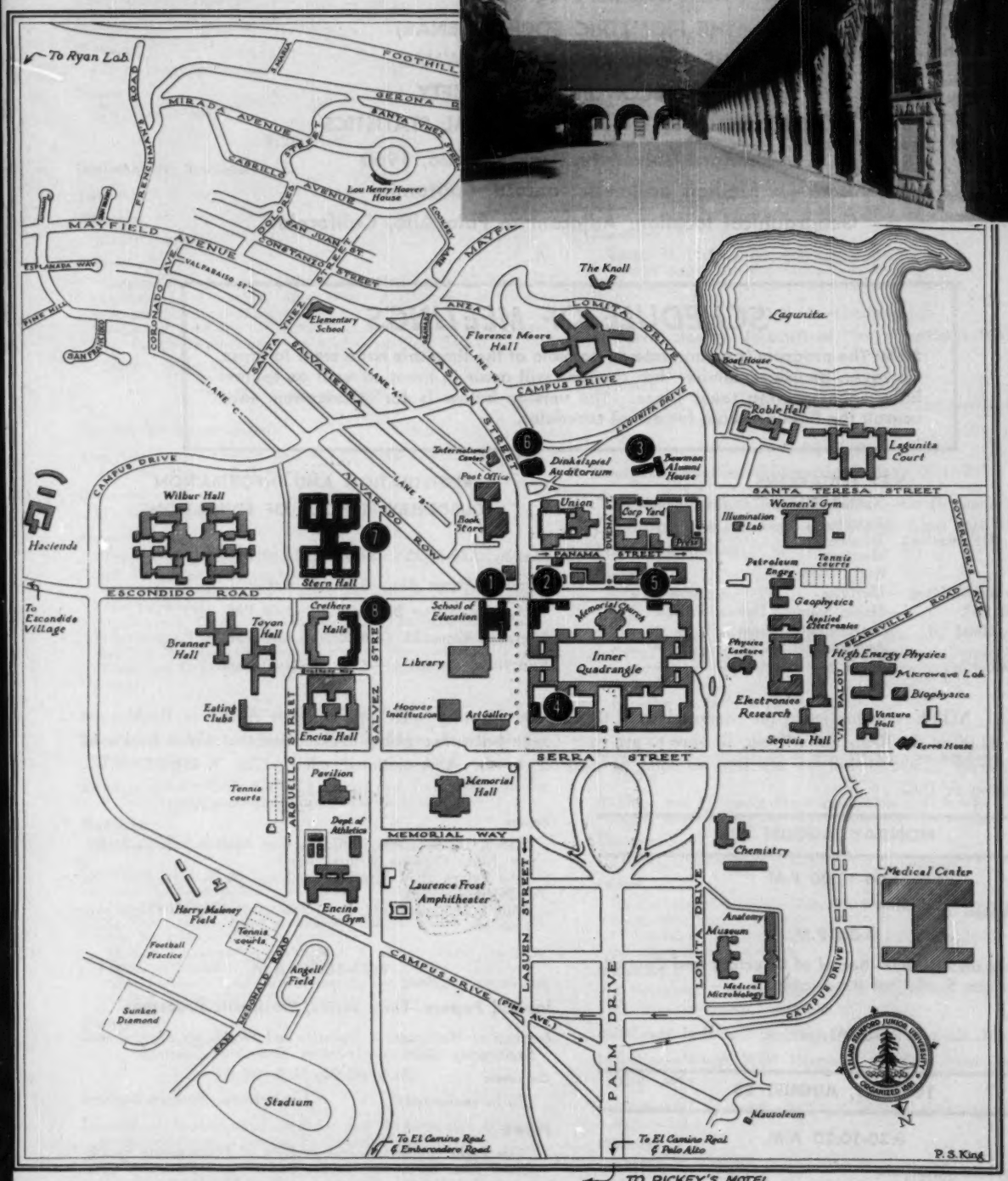
Four hundred miles to the south of San Francisco lie the many attractions of Los Angeles and the Southern California region, including Hollywood, Santa Barbara and San Diego. For further details about the Stanford meetings, see also the item entitled, "Annual Meeting, August 23-26" on page 2 of this issue.

Bowman Alumni House

KEY TO ACTIVITIES

1. Conference registration, exhibits, meetings
2. Meetings
3. Economic Outlook Luncheon
4. Meetings
5. Meetings
6. Meeting Tuesday evening, also headquarters of 1960 International Conference of Logic, Methodology and Philosophy of Science
7. Residence halls and dining rooms
8. Residence hall

Inner Quad, Stanford University



The Campus of

STANFORD UNIVERSITY

Program of the 120th Annual Meeting of the

American Statistical Association

with the Programs of

THE BIOMETRIC SOCIETY (ENAR)

THE BIOMETRIC SOCIETY (WNAR)

THE ECONOMETRIC SOCIETY

THE INSTITUTE OF MATHEMATICAL STATISTICS

Stanford University, August 23-26, 1960

Mailing address: Stanford, California

Geographical location: Adjacent to Palo Alto, California

SCHEDULE OF MEETINGS

Note: The program is as accurate as possible at the time this issue went to press. However, please remember that changes will occur in times as well as content before the meeting takes place. The version below is for information only; consult the final program for actual schedules.

KEY LOCATIONS

Bowman Alumni House—Annual Economic Outlook Luncheon

Cubberley Hall (School of Education) —Exhibits
Information
Meetings
Registration

Engineering Building —Meetings

Memorial Hall —Music, Stanford University, Host

Rickey's Motel —Presidential Address
Annual Informal Party

Stern Hall —Meals and Residences

REGISTRATION AND INFORMATION
CUBBERLEY (SCHOOL OF EDUCATION)

Monday, August 22	—1:00 PM-10:00 PM
Tuesday, August 23	—8:00 AM- 6:00 PM
Wednesday, August 24	—8:00 AM- 6:00 PM
Thursday, August 25	—8:00 AM- 6:00 PM
Friday, August 26	—8:00 AM-12:00 noon

SPECIAL NOTE: Summaries of the papers given at this Annual Meeting will appear in an Abstracts Booklet on sale for $1.00 at the Registration Desk. Be sure to get your copy. **Authors:** please make sure that three copies of your abstract (150-200 words) are sent *as soon as possible* to the ASA national office, 1757 K Street, N.W., Washington 6, D.C.

MONDAY, AUGUST 22

1:00-10:00 P.M.

Registration

4:30 P.M.

***Meeting and Dinner—Board of Directors and Council, American Statistical Association**

Chairman:
MORRIS H. HANSEN, President, American Statistical Association

TUESDAY, AUGUST 23

8:30-10:20 A.M.

Multivariate Analysis

Biometric Society (ENAR and WNAR) and Biometrics Section, American Statistical Association

Chairman:
(To be announced)

Papers:

"Recent Developments in Multivariate Analysis," R. L. ANDERSON, North Carolina State College
"The Future of Multivariate Analysis," S. N. ROY, University of North Carolina
(Title to be announced), R. E. BARGMANN, Virginia Polytechnic Institute

8:30-10:20 A.M.

Invited Papers—Time Series, Stochastic Processes

Institute of Mathematical Statistics and Section on Physical and Engineering Sciences, American Statistical Association

Chairman:
(To be announced)

Papers:

"New Light on the Classical Problem of Decomposing an Observed Time Series into Trend, Periodic and Stationary Components," J. DURBIN, University of North Carolina
"The Design of Experiments with Autocorrelated Errors," G. M. JENKINS, Stanford University and Imperial College
(Another to be announced)

* Fee or invited event.

TUESDAY, AUGUST 23 (Cont.)

8:30-10:20 A.M.

Contributed Papers—I

Institute of Mathematical Statistics

Chairman:
(To be announced)

Papers:
(To be announced)

9:30 A.M.

Econometric Studies

Econometric Society

Chairman:
(To be announced)

Papers:
"Cooperative Advertising: Preliminary Findings of a Study of the Demand for Oranges," MARC NERLOVE, University of Minnesota and Stanford University
"Statistical Evidence and Anti-Trust: the Trailer-Truck Industry," ROBERT WEINTRAUB, City College of New York
(Another to be announced)

10:30 A.M.-12:20 P.M.

Design of Experiments

Biometric Society (ENAR and WNAR) and Biometrics Section, American Statistical Association

Chairman:
(To be announced)

Papers:
(Title to be announced), R. GNANADESIKAN and M. B. WILK, Bell Telephone Laboratories
"Mixed Factorials in Incomplete Blocks," B. V. SHAH, Iowa State University
"A General Theory for Assymetrical Confounded Factorial Experiments," B. KURKJIAN, Diamond Ordnance Fuse Laboratory and M. ZELEN, National Bureau of Standards
"Cumulant Component Analysis," D. S. ROBSON, Cornell University

10:30 A.M.-12:20 P.M.

Seasonal Adjustments—Improving Them for Business Forecasting

Business and Economic Statistics Section and Section on Training of Statisticians, American Statistical Association

Chairman:
JULIUS SHISKIN, U. S. Bureau of the Census

Papers:
"Some Problem Areas," W. DUANE EVANS, U. S. Bureau of Labor Statistics
"Problems of Adjusting Automotive Series," JOHN A. FRECHTLING, Ford Motor Company
"Moving Amplitude Adjustments," E. CRAIG WEST, Dominion Bureau of Statistics
"Some Proposals for Future Research," MICHAEL J. CONLON and ALLAN J. YOUNG, U. S. Bureau of the Census

Discussion:
(To be announced)

10:30 A.M.-12:20 P.M.

Invited Papers—Statistics I

Institute of Mathematical Statistics and Business and Economic Statistics Section, American Statistical Association

Chairman:
(To be announced)

Papers:
"Successive Process of Statistical Controls," T. KITAGAWA, Kyusyu University
"Tolerance Regions," I. GUTTMAN, McGill University
(Title to be announced), F. C. ANDREWS, University of Oregon

* Fee or invited event.

10:30 A.M.-12:20 P.M.

Planning of Sample Surveys for Social Research in Underdeveloped Countries

Section on Training of Statisticians and Social Statistics Section, American Statistical Association

Chairman:
LESLIE KISH, University of Michigan

Papers:
"Survey Sampling and Implementation for Development Programs," ROE GOODMAN, U. S. Bureau of the Census
"Methods for Cross-Cultural Validity," BRADFORD B. HUDSON, Rice Institute
"Obtaining Data on Consumption, Savings and Family Budgets in Underdeveloped Countries," E. SCOTT MAYNES, University of Minnesota
"Training for Survey Research in Underdeveloped Countries," RENSIS LIKERT, University of Michigan

Discussion:
PHILIP M. HAUSER, University of Chicago
DUDLEY KIRK, The Population Council, Inc.
CALVERT L. DEDRICK, U. S. Bureau of the Census

12:30 P.M.—Luncheon *

Editorial Board, Journal of The American Statistical Association

Chairman:
CLIFFORD G. HILDRETH, Editor, *Journal of the American Statistical Association*

1:00 P.M.

Business Meeting—Biometric Society (ENAR)

2:00 P.M.

Organizations, Games, and Bargaining

Econometric Society

Chairman:
(To be announced)

Papers:
"A Simplified Bargaining Model for the n-Person Cooperative Game," JOHN HARSANYI, Australian National University
"Leadership," JACOB MARSCHAK, University of California at Los Angeles
(Another to be announced)

2:00-3:50 P.M.

Inventory Forecasting—Coming Improvements in the '60's

Business and Economic Statistics Section and Section on Training of Statisticians, American Statistical Association

Chairman:
LOUIS J. PARADISO, U. S. Department of Commerce

Papers:
"A Critique of Inventory Forecast Approaches," THOMAS STANBACK, New York University
"Purchasing and Inventory Forecasting," JOHN H. HOAGLAND, Michigan State University

Discussion:
J. FREDERICK WESTON, University of California at Los Angeles
VICTOR ZARNOWITZ, University of Chicago

2:00-3:50 P.M.

Inflation—What Will Happen to the Price Level in the '60's

Business and Economic Statistics Section, American Statistical Association

Chairman:
GEORGE P. HITCHINGS, American Airlines, Inc.

Papers:
"Wage Push and Business Pricing Policies," JULES BACHMAN, New York University
"Monetary and Fiscal Policies and the Impact of International Competition" (Speaker to be announced)

Discussion:
(To be announced)

TUESDAY, AUGUST 23 (Cont.)

2:00-3:00 P.M.

Special Invited Paper

Institute of Mathematical Statistics

Chairman:
(To be announced)

Paper:
(To be announced)

2:00-3:50 P.M.

Statistics of Crime and Correction—I

Social Statistics Section, American Statistical Association and Pacific Sociological Association

Chairman:
CLARENCE C. SCHRAG, University of Washington

Papers:
"Current Problems in Police Statistics," JOHN I. GRIFFIN, City College of New York
"Court and Probation Statistics," GEORGE DAVIS, California Bureau of Criminal Statistics
"Prisoner Statistics—National and State," JAMES MCCAFFERTY, U. S. Bureau of Prisons

Discussion:
(To be announced)

(Statistics of Crime and Correction—II will continue in same room at 4:00 P.M.)

2:00-3:50 P.M.

Present Status of Correlation and Regression

Biometric Society (ENAR and WNAR) and Biometrics Section, American Statistical Association

Chairman:
(To be announced)

Papers:
"Simple Nearly Least Squares Estimates in Heteroscedastic Regression," MAX HALPERIN, Knolls Atomic Power Laboratory
(Others to be announced)

3:00-4:50 P.M.

Invited Papers—Information Theory

Institute of Mathematical Statistics

Chairman:
(To be announced)

Papers:
"A Calculus of Information," B. MCMILLAN, Bell Telephone Laboratories
"Another Approach to Information Theory," L. BREIMAN, University of California at Los Angeles
"On the Quantity of Information of Kolmogorov," S. P. LLOYD, Bell Telephone Laboratories

3:00-4:50 P.M.

Contributed Papers—II

Institute of Mathematical Statistics

Chairman:
(To be announced)

Papers:
(To be announced)

4:00-5:50 P.M.

Industrial Production—Analysis and Prospects

Business and Economic Statistics Section, American Statistical Association

Chairman:
KENNETH B. WILLIAMS, Federal Reserve Board

Papers:
"Long Range Prospects for Industrial Production," J. C. SWARTLEY, American Telephone & Telegraph Company
"Use of Industrial Production for Short Term Economic Analysis," CLAYTON GEHMAN, Federal Reserve Board
"The Use of the Production Index for Business Planning," DOUGLAS GREENWALD, McGraw-Hill Publishing Company

Discussion:
WILLIAM SHAW, E. I. duPont de Nemours & Company
HARRY S. SCHWARTZ, Federal Reserve Bank of San Francisco

4:00-5:50 P.M.

Spectral Analysis of Time Series

Section on Physical and Engineering Sciences, American Statistical Association and Institute of Mathematical Statistics

Chairman:
LUCIEN LECAM, University of California, Berkeley

Papers:
"Mathematical Considerations in the Estimation of Spectra," E. PARZEN, Stanford University
"General Considerations in the Estimation of Spectra," G. M. JENKINS, Stanford University

Discussion:
(To be announced)

4:00-5:50 P.M.

Statistics of Crime and Correction—II (See also session I at 2:00 P.M.)

Social Statistics Section, American Statistical Association and Pacific Sociological Association

Chairman:
RONALD H. BEATTIE, California Bureau of Criminal Statistics

Papers:
"Recent Developments in Federal Criminal Statistics," DANA M. BARBOUR, U. S. Office of Statistical Standards
"Measurement of Juvenile Delinquency," PETER P. LEJINS, University of Maryland
"Summary Statement," RONALD H. BEATTIE, California Bureau of Criminal Statistics

Discussion:
RICHARD PERLMAN, U. S. Children's Bureau

4:00-5:50 P.M.

The Business Statistics Curriculum Recommendations of *Higher Education for Business* by Gordon & Howell

Section on Training of Statisticians, American Statistical Association

Chairman:
R. CLAY SPROWLS, University of California at Los Angeles

Round Table:
EDWARD C. BRYANT, University of Wyoming
C. WEST CHURCHMAN, University of California, Berkeley
RICHARD M. CYERT, Carnegie Institute of Technologoy
KERMIT O. HANSON, University of Washington
FRANK J. WILLIAMS, San Francisco State College

5:00 P.M.

Business Meeting—Biometrics Section, American Statistical Association

Chairman:
PAUL MEIER, Chairman, Biometrics Section, American Statistical Association

5:00 P.M.

* 1960 Council Meeting—Institute of Mathematical Statistics

6:30 P.M.—DINNER

Business Meeting—Section on Training of Statisticians, American Statistical Association

Chairman:
J. PARKER BURSK, University of Pennsylvania

* Fee or invited event.

TUESDAY, AUGUST 23 (Cont.)

8:00-9:50 P.M.

World Population Growth—Its Implications for Us in the '60's

American Statistical Association and Western Farm Economic Association

Chairman:

CONRAD TAEUBER, U. S. Bureau of the Census

Papers:

"Implications of Prospective Population Growth in the 1960's," JOSEPH S. DAVIS, Stanford University

"Implications of Prospective Population Growth in the World," DUDLEY KIRK, The Population Council, Inc.

Discussion:

IRA T. ELLIS, E. I. duPont de Nemours & Company

PHILIP M. HAUSER, University of Chicago

WEDNESDAY, AUGUST 24

7:30 A.M.—Breakfast *

Meeting of Chapter Presidents and Secretaries and District Representatives, *American Statistical Association*

Chairman:

DONALD C. RILEY, Executive Director, American Statistical Association

8:30-10:20 A.M.

Problems in Medical Statistics

Biometric Society (ENAR and WNAR) and Biometrics Section, American Statistical Association

Chairman:

WALTER E. HOADLEY, JR., Armstrong Cork Co.

Papers:

"Problems in Pathology with Statistical Aspects," BRADLEY E. COPELAND, New England Deaconess Hospital

"Statistical Aspects of Medical Problems of National Interest," THE HON. DALE ALFORD, U. S. House of Representatives

Discussion:

CARL E. HOPKINS, University of Oregon Medical School

R. G. HOFFMAN, University of Florida

8:30-10:20 A.M.

The Stock Market—What's Going to Happen Next Year and After That?

Business and Economic Statistics Section, American Statistical Association

Chairman:

DANIEL H. BRILL, Federal Reserve Board

Papers:

"Short Range Prospects for Stock Prices," JOSEPH A. LIVINGSTON, The Philadelphia Bulletin

"Long Range Prospects for Stock Prices," PHILIP BLAISDELL, Stein, Roe & Farnum

Discussion:

ALAN GREENSPAN, Townsend-Greenspan & Company

PHILIP J. FITZGERALD, Dean Witter & Co.

8:30-10:20 A.M.

Contributed Papers—III

Institute of Mathematical Statistics

Chairman:

(To be announced)

Papers:

(To be announced)

* Fee or invited event.

8:30-10:20 A.M.

Industrial Applications

Section on Physical and Engineering Sciences, American Statistical Association

Chairman:

G. J. LIEBERMAN, Stanford University

Papers:

"A Sampling Inspection Plan by Variables Which Guarantees Acceptance of Screened Lots," MAX WOODS, Stanford University

"A Problem in Plumbing," W. S. CONNOR, Research Triangle Institute and N. C. SEVERO, University of Buffalo

"A Generalized Guarantee Policy," LLOYD BELL, Stanford University

Discussion:

MAVIS CARROLL, General Foods Corporation

C. J. KIRCHEN, Ford Motor Co.

8:30-10:20 A.M.

Validity and Interviewer Variance

Social Statistics Section and Section on Training of Statisticians, American Statistical Association

Chairman:

(To be announced)

Papers:

"Studies of Validity in Reporting Financial Data," JOHN B. LANSING, University of Michigan

"A Study of Validity in Reporting Medical Care in Michigan," ROBIN BARLOW, GROVER WIRICK and JAMES MORGAN, University of Michigan

"Two Studies of Interviewer Variance of Social-Psychological Variables," LESLIE KISH and CAROL W. SLATER, University of Michigan

Discussion:

ELEANOR MACCOBY, Stanford University

ELI S. MARKS, National Analysts, Inc.

8:30-10:20 A.M.

Invited Papers—Discriminant Functions and Classification Techniques

Institute of Mathematical Statistics and Biometric Society (ENAR and WNAR)

Chairman:

(To be announced)

Papers:

"The Theory of Discriminant Functions and Classification Techniques," R. SITGREAVES, Columbia University

"Reduction of Variates Relative to Classification," R. A. SHAW, International Business Machines Corporation

"On the Generalization of Classification Techniques," C. F. KOSSACK, International Business Machines Corporation

"A General Computer Program for Multivariate Analysis of Variance, with Special Reference to the Multiple Discrimination Problem," R. D. BOCK, University of North Carolina

9:30 A.M.

International Comparisons of Economic Structure

Econometric Society

Chairman:

HOLLIS CHENERY, Stanford University

Papers:

"Interindustry Structures in Less Developed Countries," T. WATANABE, Stanford University

"An International Comparison of the Rate of Return on Capital in Manufacturing Industry," B. MINHAS, Stanford University

"Factor Proportions and Relative Prices in Japan and the United States," G. BICKEL, Stanford University

WEDNESDAY, AUGUST 24 (Cont.)

10:30 A.M.-12:20 P.M.

Design of Experiments

Biometric Society (ENAR and WNAR) and Biometrics Section, American Statistical Association

Chairman:

(To be announced)

Papers:

"Augmented Designs with Two and Three Way Elimination of Heterogeneity," W. T. FEDERER, Cornell University
"The Design and Interpretation of Field Trials," G. A. BAKER and BURT HOYLE, University of California, Davis
(Another to be announced)

10:30 A.M.-12:20 P.M.

Profits—Up or Down?

Business and Economic Statistics Section, American Statistical Association

Chairman:

JOEL DEAN, Joel Dean Associates

Papers:

"Profit Forecasting—A Statistical Approach," EDMUND A. MENNIS, The Wellington Management Company
"Profit Prospects in 1961," WILLIAM F. BUTLER, The Chase Manhattan Bank
"The Influence of Monetary and Fiscal Policy," (Speaker to be announced)

Discussion:

(To be announced)

10:30 A.M.-12:20 P.M.

Review of Social Statistics

Social Statistics Section, American Statistical Association and Pacific Sociological Association

Chairman:

FREDERICK F. STEPHAN, Princeton University

Paper:

"Present Condition and Future Prospects of Social Statistics," RAYMOND T. BOWMAN, ALEXANDER GALL, and ISRAEL RUBIN, U. S. Office of Statistical Standards

Discussion:

(To be announced)

10:30 A.M.-12:20 P.M.

Opportunities for Statisticians in the International Field

Section on Training of Statisticians, American Statistical Association

Chairman:

CALVERT L. DEDRICK, U. S. Bureau of the Census

Papers:

"Opportunities with International Organizations," CHARLES F. SARLE, United Nations Food and Agriculture Organization
"Opportunities with United States Programs," SOPHYA BALICKA, International Cooperation Administration

Discussion:

TULO H. MONTENEGRO, Inter American Statistical Institute
MAX LACROIX, United Nations
(Others to be announced)

11:00 A.M.-12:00 Noon

Special Invited Paper

Institute of Mathematical Statistics

Chairman:

(To be announced)

Paper:

(To be announced)

12:30 P.M.—Luncheon *

The Economic Outook for 1961

Business and Economic Statistics Section, American Statistical Association, Western Farm Economics Association and Western Economic Association

Chairman:

MARTIN R. GAINSBRUCH, National Industrial Conference Board

Speaker:

JESSE W. TAPP, Bank of America

1:00 P.M.

Business Meeting—Biometric Society (WNAR)

2:00 P.M.

Analysis of Economic Stability

Econometric Society

Chairman:

FRANK H. HAHN, University of California, Berkeley and University of Birmingham

Papers:

"On a Dual Stability Theorem," DALE W. JORGENSON, University of California, Berkeley
"Edgeworth's Barter Process and Walras' Tatonnement Process," HIROFUMI UZAWA, Stanford University
"Some Examples of Global Instability of the Competitive Equilibrium," HERBERT SCARF, Stanford University and Cowles Foundation for Research in Economics
"Speculation and the Stability of Futures Markets," PAUL H. COOTNER, Massachusetts Institute of Technology

2:00-3:50 P.M.

Study of Growth

Biometric Society (ENAR and WNAR) and Biometrics Section, American Statistical Association

Chairman:

(To be announced)

Papers:

"Current Research and Statistical Needs in Growth Studies," B. S. KRAUS, University of Washington
"A Geometrical Model for Height-Weight Control Charts in Schoolchildren," HARLEY B. MESSINGER, University of California

2:00-3:50 P.M.

Invited Papers—Applied Probability

Institute of Mathematical Statistics

Chairman:

S. KARLIN, Stanford University

Papers:

"Some Problems of Dams with Ordered Inputs," J. GANI, University of Western Australia
"The Solution of Queueing and Inventory Models by the Theory of Semi-Markov Processes," A. J. FABENS, Dartmouth College
(Title to be announced), J. SACKS, Columbia University
"Continuous Time Storage Systems with Linear Inputs and Outputs," R. MILLER, Stanford University

2:00-3:50 P.M.

The Computer in Research in Statistics

Section on Physical and Engineering Sciences, American Statistical Association

Chairman:

D. B. OWEN, Sandia Corporation

Papers:

"Computational Codes for Statistical Analysis and Research," F. C. LEONE, Case Institute of Technology
"The Construction of Orthogonal Latin Squares of Non-Prime Power and Related Orthogonal Arrays, Using a Computer," I. M. CHAKRAVARTI, University of North Carolina
"Computer Techniques in the Statistical Investigation of Non-Linear Parametric Relations," T. I. PETERSON, International Business Machines Corporation

Discussion:

MARVIN MULLER, International Business Machines Corporation
JULIUS LIEBLEIN, David Taylor Model Basin

* Fee or invited event.

WEDNESDAY, AUGUST 24 (Cont.)

2:00-3:50 P.M.

Education

Social Statistics Section, American Statistical Association

Chairman:
(To be announced)

Papers:
"The Statistical Program of the U. S. Office of Education," ROY HALL, U. S. Office of Education
"Progress Report on Project Talent," JOHN C. FLANAGAN, American Institute for Research
"Projecting Enrollments at the University of Toronto," GILBERT DEB. ROBINSON, University of Toronto

4:00-5:50 P.M.

Quantification and Measurement

Biometric Society (ENAR and WNAR) and Biometrics Section, American Statistical Association

Chairman:
CLIFFORD J. MALONEY, Army Biological Warfare Laboratories

Papers:
"Foundations of Measurement," P. SUPPES, Stanford University
"A Review of Mathematical Aspects of the Theory of Measurement," ROBERT M. THRALL, University of Michigan
"A Sequential Decision Theory Applied to Medical Diagnosis," ROBERT S. LEDLEY, National Academy of Sciences

4:00-5:50 P.M.

Efficient Capital Planning—Improvements in the '60's

Business and Economic Statistics Section, American Statistical Association

Chairman:
J. HOWARD CRAVEN, Bank of America

Papers:
"Changes in the Economic Life Expectancy of Capital Investments," THEODORE J. KREPS, Stanford University
"Anticipating the Expanding Markets of the '60's," GAULT LYNN, SR., Federal Reserve Bank of San Francisco
"Capital Investment: Plans and Performances," DEXTER M. KEEZER, McGraw-Hill Publishing Co.

Discussion:
(To be announced)

4:00-5:50 P.M.

Where Are Our Future Statisticians?

Section on Training of Statisticians, American Statistical Association

Chairman:
FRED C. LEONE, Case Institute of Technology

Round Table:
WILLARD CLATWORTHY, Westinghouse Electric Corporation
JEROME CORNFIELD, National Institutes of Health
CARL F. KOSSACK, International Business Machines Corporation
GEORGE E. NICHOLSON, University of North Carolina

4:00 P.M.

Business Meeting—Institute of Mathematical Statistics

4:30 P.M.

Business Meeting—Social Statistics Section, American Statistical Association

Chairman:
FREDERICK F. STEPHAN, Chairman, Social Statistics Section, American Statistical Association

7:30 P.M.

Special Invited Address

A General Session of the American Statistical Association

Chairman:
MORRIS H. HANSEN, President, American Statistical Association

Address:
"Indeterminism in Science and the New Demands on the Theory of Statistics," JERZY NEYMAN, University of California, Berkeley

9:00 P.M.

Music—Stanford University, Host

THURSDAY, AUGUST 25

7:30 A.M.—Breakfast

Business Meeting—Business and Economic Statistics Section, American Statistical Association

Chairman:
JAMES W. KNOWLES, Chairman, Business and Economic Statistics Section, American Statistical Association

8:30-10:20 A.M.

Biometrical Genetics

Biometric Society (ENAR and WNAR) and Biometrics Section, American Statistical Association

Chairman:
(To be announced)

Papers:
"The Partial Diallel Cross," O. KEMPTHORNE, Iowa State University and R. N. CURNOW, University of Aberdeen
"Genetic-Environmental Interaction Model," C. KALLER, Purdue University
"On the Theory of Improvement of Metric Traits in Outbreeding Populations," C. J. MODE, Montana State College

8:30-10:20 A.M.

Probability

Institute of Mathematical Statistics

Chairman:
(To be announced)

Papers:
"On Invariant Probability Measures," J. R. BLUM, Sandia Corporation
"On Random Walks in the Plane," G. E. BAXTER, University of Minnesota
"The Ranking Limit Problem for Markov Chains," R. COGBURN, University of California
(Another to be announced)

8:30-10:20 A.M.

The 1960 Census of Population and Housing

Social Statistics Section, American Statistical Association

Chairman:
CONRAD TAEUBER, U. S. Bureau of the Census

Papers:
"The Concept of 'Usual Residence' in the Census of Population," HENRY S. SHRYOCK, JR., U. S. Bureau of the Census
Discussant: CARL FRISEN, California State Department of Finance
"The 1960 Housing Inventory—Concepts, Coverage and Trends," WAYNE F. DAUGHERTY, U. S. Bureau of the Census
Discussant: LEO GREBLER, University of California at Los Angeles
"Some Preliminary Results of the 1960 Census," HOWARD G. BRUNSMAN and CHARLES P. BRINKMAN, U. S. Bureau of the Census

THURSDAY, AUGUST 25 (Cont.)

8:30-10:20 A.M.

Statistical Education of Non-Statisticians in Industry and Medicine

Section on Training of Statisticians and Biometrics Section, American Statistical Association

Chairman:

HAROLD F. DORN, National Institutes of Health

Round Table:

WILFRID J. DIXON, University of California at Los Angeles
WALTER E. HOADLEY, JR., Armstrong Cork Company
WILLIAM TAYLOR, University of California, Berkeley
THEODORE J. KREPS, Stanford University

8:30-10:20 A.M.

Statistical Training for Operations Research

Section on Training of Statisticians and Business and Economic Statistics Section, American Statistical Association

Chairman:

BENJAMIN J. TEPPING, National Analysts, Inc. and University of Pennsylvania

Round Table:

C. WEST CHURCHMAN, University of California, Berkeley
GEORGE B. DANTZIG, Rand Corporation
WILLIAM G. MADOW, Stanford University
PAUL H. RANDOLPH, Purdue University

9:30 A.M.

Production and Pricing

Econometric Society

Chairman:

(To be announced)

Papers:

"Regressive Expectations," JOHN D. BOSSONS, Harvard University
"The Economics of Decreasing Costs and Discrete Production Runs," EDWIN S. MILLS, The Johns Hopkins University
(Another to be announced)

10:30 A.M.-12:20 P.M.

Coming Improvements in Business Cycle Forecasting in the '60's

Business and Economic Statistics Section and Section on Training of Statisticians, American Statistical Association

Chairman:

PAUL W. MCCRACKEN, University of Michigan

Papers:

"Application of Electronic Computers to Business Cycle Research," GERHARD BRY, National Bureau of Economic Research and Rutgers University and CHARLOTTE BOSCHAN, National Bureau of Economic Research
"Problems of Regional Economic Forecasting: California as a Case Illustration," THEODORE A. ANDERSON, University of California at Los Angeles

Discussion:

MICHAEL C. WHITE, University of Michigan
EUGENE CLARK, University of Washington

10:30 A.M.-12:20 P.M.

Invited Papers—Honoring Harold Hotelling at his 65th Birthday—I

Multifactor-Multiresponse Experiments—Continuous Responses, Normal and Non-Normal

Institute of Mathematical Statistics and Biometric Society (ENAR and WNAR)

Chairman:

(To be announced)

Papers:

(Title to be announced) S. N. ROY, University of North Carolina
"Normal Responses with Applications," R. GNANADESIKAN, University of North Carolina
(Another to be announced)

10:30 A.M.-12:20 P.M.

Population Differentials in Mortality

Social Statistics Section, American Statistical Association

Chairman:

(To be announced)

Papers:

"Social and Economic Differentials in Mortality in the United States by Cause of Death," PHILIP M. HAUSER and EVELYN M. KITAGAWA, University of Chicago
"Population Laboratories for Research in Public Health and Demography," G. ST. J. PERROTT, Conference on Community Population Laboratories

10:30 A.M.-12:20 P.M.

Unemployment and the Labor Force

Social Statistics Section, American Statistical Association

Chairman:

(To be announced)

Papers:

"The National Picture," ROBERT J. MYERS, U. S. Bureau of Labor Statistics
"State Comparisons of Characteristics of the Insured Unemployed," LOUIS LEVINE, U. S. Bureau of Employment Security
"Labor Force Projections for California," MAURICE I. GERSHENSON, California Dept. of Industrial Relations

10:30 A.M.-12:20 P.M.

What We Now Know About Index Numbers

Section on Training of Statisticians and Business and Economic Statistics Section, American Statistical Association

Chairman:

JOHN M. FIRESTONE, City College of New York

Papers:

"Price Indexes," ARNOLD CHASE, U. S. Bureau of Labor Statistics
"Quantity Indexes," MILTON MOSS, Federal Reserve Board

Discussion:

(To be announced)

12:30 P.M.—LUNCHEON *

Census Tracts: Are We Ready for the 1960 Census Data?

American Statistical Association

Chairman:

HARLIN G. LOOMER, Chairman, Committee on Census Enumeration Areas, American Statistical Association (including "Report on Status of Census Tract Work in Local Communities")

Papers:

"Fields of Application of Census Small-Area Data" (Speaker to be announced)
"Tools and Techniques for Processing Census Data" (Speaker to be announced)
(Census Tract Conference continues at 2:00 P.M.)

1:00 P.M.

Meeting, Regional Advisory Board—Biometric Society (ENAR)

2:00-3:50 P.M.

Census Tract Conference (continued from luncheon)—What Data Will Be Available and When?

American Statistical Association

Chairman:

ROBERT C. KLOVE, U. S. Bureau of the Census (including "Report on Expansion of the Tract Program")

Papers:

"Current Status of the Census Program and Schedule for Pub-

* Fee or invited event.

lication of Small-Area Data," CONRAD TAEUBER, U. S. Bureau of the Census
"Details of the Population Tabulations," HOWARD G. BRUNSMAN, U. S. Bureau of the Census
"Details of the Housing Tabulations," WAYNE F. DAUGHERTY, U. S. Bureau of the Census

Discussion Period

2:00 P.M.

Meeting of Experiment Station Statisticians

American Statistical Association

Chairman:
E. L. LECLERG, U. S. Department of Agriculture

2:00 P.M.

Programming

Econometric Society

Chairman:
HERBERT SCARF, Stanford University and Cowles Foundation for Research in Economics

Papers:
"Linear Programming in a Markov Chain," GEORGE B. DANZIG and PHILLIP WOLFE, Rand Corporation
"Optimal Allocation of Income Among Generations," ROY RADNER, University of California, Berkeley
"Combined Inventory-Transportation Models," THOMAS WHITIN and G. F. HADLEY, University of California, Berkeley, and Massachusetts Institute of Technology

2:00-3:00 P.M.

Special Invited Paper

Institute of Mathematical Statistics

Chairman:
(To be announced)

Paper:
"A Survey of Time-Series Analysis," E. PARZEN, Stanford University

2:00-3:50 P.M.

Forecasting Trends in Styling

Business and Economic Statistics Section, American Statistical Association

Chairman:
DWIGHT E. ROBINSON, University of Washington

Papers:
"Improved Factual Tools for Measuring Styling Trends in the '60's," MYRON HELFGOTT, Lippincott and Margolies
"The Use of Experimental Research In Predicting Style and Color Preferences," WALTER WOODS, The Nowland Company

Discussion:
HECTOR S. ESCOBOSA, I. Magnin & Company

2:00-3:50 P.M.

Reliability

Section on Physical and Engineering Sciences, American Statistical Association

Chairman:
GEORGE L. LEVENBACH, Bell Laboratories

Papers:
"Analysis of Failure Data on Components," W. S. CONNOR and W. T. WELLS, Research Triangle Institute
"Investigation of the Robustness of Statistical Life Testing Procedures," MARVIN ZELEN and MARY C. DANNEMILLER, National Bureau of Standards
"Decision Rules in Reliability Testing," DAVID S. STOLLER, Rand Corporation

Discussion:
PHILIP BROWN, U. S. Navy Department
FRANK PROSCHAN, Sylvania Electric Products, Inc.

2:00-3:50 P.M.

Metropolitan Areas and Urban Growth—I

Social Statistics Section, American Statistical Association and Pacific Sociological Association

Chairman:
(To be announced)

Papers:
"Basic Economic Materials for Metropolitan Research," JOHN I. GRIFFIN, City College of New York
"The Metropolitan Area and External Lines of Communication," DAVID L. GLICKMAN, Port of New York Authority
"The Flight to the Suburbs Slackens," A. F. PARROTT, Consolidated Edison Company of New York
(Continued at 4:00 P.M. as Session II)

2:00-3:50 P.M.

Statistical Training for Electronic Data Processing

Section on Training of Statisticians, American Statistical Association

Chairman:
JULIUS SHISKIN, U. S. Bureau of the Census

Papers:
"Training the Undergraduate in the Use of the Computer with Special Reference to Students of Statistics," ABRAHAM TAUB and WALTER C. JACOB, University of Illinois
"What Training Is Required to Enable Statisticians to Exploit Computers for the Benefit of Statistics?" MILLARD HASTAY, State College of Washington
"Training the Practicing Statistician," MAURICE H. SCHWARTZ, Federal Reserve Board

Discussion:
JOSEPH F. DALY, U. S. Bureau of the Census
CLARENCE R. JAUCHEM, Committee on Post Office and Civil Service, U.S. House of Representatives

3:00-5:00 P.M.

Invited Papers—Statistics—II

Institute of Mathematical Statistics

Chairman:
(To be announced)

Papers:
"Admissible and Optimal Designs in the Presence of Nuisance Parameters," G. ELFVING, University of Helsingfors
"Some Comparisons Among Different Types of Random Allocation Designs," A. P. DEMPSTER, Harvard University
"Estimating a Mixed Exponential Response Law," F. J. ANSCOMBE, Princeton University and Mathematica
(Another to be announced)

3:00-5:00 P.M.

Contributed Papers

Institute of Mathematical Statistics

Chairman:
(To be announced)

Papers:
(To be announced)

4:00-5:50 P.M.

Contributed Papers

Biometric Society (ENAR and WNAR) and Biometrics Section, American Statistical Association

Chairman:
(To be announced)

Papers:
"A Problem of Testing and Estimation Involving Four-Fold Tables," WILLIAM TAYLOR, University of California, Berkeley and JOSEPH BERKSON, Mayo Clinic
"Tests of Hypotheses Concerning Boundedness in Convolutions," WILLIAM R. GAFFEY, California Dept. of Health
"Durations of Illness," H. M. C. LUYKX and BETTY L. MURRAY, Office of Surgeon General, USAF

THURSDAY, AUGUST 25 (Cont.)

"Some Aspects of Screening Tests for the Detection of Disease Suspects," R. M. THORNER and Q. R. REMEIN, U.S. Public Health Service
"Analysis of Variance of Differences Versus Analysis of Covariance," K. ABT, U. S. Naval Weapons Laboratory
"A Variable Rank Sum Multiple Comparisons Test," R. G. D. STEEL, Cornell University
"The Means and Variances of the Products of Two or Three Normal Variables," K. H. LU, Utah State University
"The Use of the Information Statistic as a Measure of Conformity in Comparing Two Sets of Responses," J. KEILIN, U. S. Public Health Service
"On Additivity in the Analysis of Variance," ROBERT ELSTON, University of North Carolina

4:00-5:50 P.M.

Anticipations, Expectations and Intentions Data as an Aid to Forecasting

Business and Economic Statistics Section and Section on Training of Statisticians, American Statistical Association

Chairman:
RAYMOND T. BOWMAN, U. S. Office of Statistical Standards

Papers:
"A Quarterly Survey of Consumer Buying Intentions," MONA DINGLE, Federal Reserve Board
"Capital Appropriations and Plant and Equipment Expenditure Expectations," MORRIS COHEN, National Industrial Conference Board
"The Function of Expectational and Motivational Data," GEORGE KATONA and EVA MUELLER, University of Michigan

Discussion:
F. THOMAS JUSTER, Amherst College
WILLIAM PETERS, Arizona State University

4:00-5:50 P.M.

Statistics in Precision Measurement

Section on Physical and Engineering Sciences, American Statistical Association

Chairman:
CHURCHILL EISENHART, National Bureau of Standards

Papers:
"Design and Control of Mass Calibration Series," H. S. PEISER, National Bureau of Standards
"An Analysis of the Accumulated Error In a Hierarchy of Calibrations," E. L. CROW, National Bureau of Standards
"The Assignment of Uncertainties to Experimental Values," A. G. MCNISH, National Bureau of Standards

Discussion:
D. B. OWEN, Sandia Corporation

4:00-5:50 P.M.

Metropolitan Areas and Urban Growth—II (Continued from Session I at 2:00 P.M.)

Social Statistics Section, American Statistical Association and Pacific Sociological Association

Chairman:
(To be announced)

Papers:
"Urban Concentration and Occupational Structure in the United States: 1900-1950," GEORGES SABAGH, MAURICE D. VAN ARSDOL, JR., and HAMID ZAHEDI, University of California at Los Angeles
"Status of Research on Methods of Estimating State and Local Populations," JACOB S. SIEGEL, U. S. Bureau of the Census

5:00 P.M.

* 1961 Council Meeting — Institute of Mathematical Statistics

6:30 P.M.—Dinner *

Business Meeting—Committee on Census Enumeration Areas, American Statistical Association

Chairman:
HARLIN G. LOOMER, Chairman, Committee on Census Enumeration Areas, American Statistical Association

6:30 P.M.—Dinner *

Meeting, 1961 Program Committee, American Statistical Association

Chairman:
_____, Chairman, 1961 Program Committee, American Statistical Association.

8:00 P.M.

Presidential Address, American Statistical Association

Chairman:
RENSIS LIKERT, University of Michigan

Speaker:
MORRIS H. HANSEN, President, American Statistical Association

10:00 P.M.

* Annual Informal Party—All Societies

FRIDAY, AUGUST 26

8:30-10:20 A.M.

Stochastic Processes in Biology and Medicine

Biometric Society (ENAR and WNAR) and Biometrics Section, American Statistical Association

Chairman:
(To be announced)

Papers:
"General Remarks on Markov Chains with Illustrative Examples in Biology," JOHN G. KEMENY, Dartmouth College
"Stochastic Processes in Biology and Medicine," L. MARTIN, President, The Biometric Society, Brussels, Belgium

8:30-10:20 A.M.

The World Census Program as a Means of Improving Factual Communication in the '60's

Business and Economic Statistics Section, American Statistical Association

Chairman:
ROBERT W. BURGESS, U. S. Bureau of the Census

Papers:
"The Entire Situation From the World Point of View" (A representative of the United Nations Statistical Organization)
"Plans and Probable Accomplishments of the Census of the Americas," TULO H. MONTENEGRO, Inter American Statistical Institute

Discussion:
JOHN T. MARSHALL, Dominion Bureau of Statistics

8:30-10:20 A.M.

Components of Variance

Section on Physical and Engineering Sciences, American Statistical Association

Chairman:
R. L. ANDERSON, North Carolina State College

Papers:
"Optimal Designs to Estimate the Parameters of Variance Component Models: One-Way Classification," S. LEE CRUMP, Brooks Air Force Base
"Optimal Designs to Estimate the Parameters of Variance Component Models: Two-Way Classification," D. W. GAYLOR, North Carolina State College
" On Σ Forms of Expectations of Mean Squares," GEORGE ZYSKIND, Iowa State University

8:30 A.M.-12:20 P.M.

Surveys and Sociometrics

Social Statistics Section, American Statistical Association

Chairman:
(To be announced)

* Fee or invited event.

FRIDAY, AUGUST 26 (Cont.)

Papers:

"A Multi-Stage Probability Sample for Traffic Surveys," WARREN B. LOVEJOY, Port of New York Authority
"Estimating the Kill of Game Animals by Licensed Hunters," LEE EBERHARDT, Michigan Department of Conservation
"Checking the Validity of the Toll Collectors Vehicle Classifications" KENNETH C. PEARSON, Massachusetts Port Authority
"Analysis of Sociometric Structure: A Method of Successive Groupings Based on Distance Measures," JACK SAWYER and TERRANCE A. NOSANCHUK, University of Chicago
"An Experiment to Measure the Effectiveness of Health and Welfare Programs for Aging Persons: Statistical Methods and Results," JULIUS A. JAHN, Community Service Society of New York

9:30 A.M.

Econometric Methods

Econometric Society

Chairman:

(To be announced)

Papers:

"Pure and Mixed Statistical Estimation in Economics," HENRI THEIL, Harvard University and Netherlands School of Economics and ARTHUR S. GOLDBERGER, University of Chicago
"The Conceptual Problem of the Cost-of-Living Index," S. N. AFRIAT, Princeton University
(Another to be announced)

10:30 A.M.-12:20 P.M.

Statistics of Natural Populations

Biometric Society (ENAR and WNAR) and Biometrics Section, American Statistical Association

Chairman:

(To be announced)

Papers:

"Estimating Vital Statistics of Yellowfin Tuna Populations," RICHARD C. HENNEMUTH, Inter-American Tropical Tuna Commission
"Sampling of Sportsmen for Fish and Game Population Statistics," A. L. FINKNER and SCOTT OVERTON, North Carolina State College
"Estimation from Populations Identified by Overlapping Sampling Frames," E. C. BRYANT and DONALD W. KING, University of Wyoming
"Some Problems In Terrestrial Ecology," D. W. HAYNE, U. S. Fish and Wildlife Service

10:30 A.M.-12:20 P.M.

Invited Papers—Honoring Harold Hotelling at his 65th birthday—II

Multifactor-Multiresponse Experiments — Categorical or Discreet Responses

Institute of Mathematical Statistics and Biometric Society (ENAR and WNAR)

Chairman:

(To be announced)

Papers:

(Title to be announced) S. N. ROY, University of North Carolina
(Others to be announced)

10:30 A.M.-12:20 P.M.

Improved Measurements of Advertising Effectiveness in the '60's

Business and Economic Statistics Section, American Statistical Association and Western Farm Economics Association

Chairman:

MERVIN D. FIELD, Field Research Company

Papers:

"The Dangers of Abstracted Empiricism or 'How Meaningful are Current Measures of Advertising Effectiveness?'" WILLIAM CAPITMAN, Center for Research in Marketing
"Models of Consumer Activity," JOHN MCGEE, Arthur D. Little, Inc.
"New Psychological Theories of Advertising—New Guides to Techniques in Prediction," IRVING S. WHITE, Creative Research Associates

Discussion:

DON MCMILLAN, Sunkist Growers, Inc.
RICHARD CRISP, Guild, Bascom, Bonfigli, Inc.

10:30 A.M.-12:20 P.M.

Business Meeting—Section on Physical and Engineering Sciences, American Statistical Association

Chairman:

PAUL R. RIDER, Chairman, Section on Physical and Engineering Sciences, American Statistical Association

10:30 A.M.-12:20 P.M.

Contributed Papers

American Statistical Association

Chairman:

ALMARIN PHILLIPS, University of Virginia

Papers:

"Training Engineers in the Use of Statistical Methods," CALVIN J. KIRCHEN, Ford Motor Co.
"A Computer Application Providing a Basis for Forecasting with Business Time Series," Z. Z. SZATROWSKI, International Business Machines Corporation
"Stochastic Analysis as Applied to the Multiple Linear Regression Equation," DICK R. LEABO, University of Michigan
"Some Solutions to the Problems of Designing Samples of Client Records at Financial Institutions," JAMES C. BURNS, Board of Governors of the Federal Reserve System
"Measuring Effect of Lettuce Advertising by Multiple Regression," H. S. HOUTHAKKER, Stanford University and FRANK MEISSNER, Stanford Research Institute
"Import-Export Price Relationships: The British Wool Trade," THOMAS A. GOLDMAN, CEIR, Inc.
"A Computer Program for the Complete Analysis of Time Series," ROBERT M. WILLIAMS, University of California
"Bayesian Tabulations and Confidence Belts," MITCHELL O. LOCKS, University of California

10:30 A.M.-12:20 P.M.

Statistics and Educational Television

Section on Training of Statisticians, American Statistical Association

Chairman:

FRANK MEISSNER, Stanford Research Institute

Papers:

"Statistics and Sports," GEORGE R. LINDSEY, Dept. of National Defense, Canada
"Computers and Statistical Analysis," J. A. NADARRO, International Business Machines Corporation

Discussion:

JAMES DAY, KQED-TV, San Francisco
DOUGLAS GREENWALD, McGraw-Hill Publishing Co.

2:00-3:50 P.M.

Measuring Improvements in the Effectiveness of Distribution in the '60's

Business and Economics Statistics Section and Section on Training of Statisticians, American Statistical Association and Western Economic Association

Chairman:

ROBERT J. EGGERT, Ford Motor Company

Papers:

"Measuring Productivity in Marketing," THEODORE BECKMAN, Ohio State University
"Productivity in Marketing—Prospects for Improvements in the '60's," REAVIS COX, University of Pennsylvania
"The Common Market in Europe and its Marketing Implications to the United States," KLAUS VON DOHNANYI, Infratest, Munich, Germany

FRIDAY, AUGUST 26 (Cont.)

Discussion:

EWAN CLAGUE, U. S. Department of Labor
M. D. KOSSORIS, Pacific Maritime Association

2:00 P.M.

Contributed Papers

Econometric Society

Chairman:

(To be announced)

Papers:

"An Exact Method of Consumer Demand Analysis," IVOR F. PEARCE, Australian National University

"Money Stock and Loan Market," KARL BRUNNER, University of California at Los Angeles

(Another to be announced)

MEETINGS OF COOPERATING ORGANIZATIONS

In addition to the organizations for which programs are listed above, the following organizations will also be meeting at Stanford University:

Western Economic Association

Western Farm Economics Association

1960 International Congress for Logic, Methodology and Philosophy of Science

The sessions of WEA *and* WFEA will appear in the final joint printed program, distributed at the meeting.

The program of the 1960 International Congress includes the following Symposia for August 24, 25, or 26.

Symposium on Current Views of Subjective Probability

Chairman:

HERMAN CHERNOFF

Participants:

I. J. GOOD
JERZY NEYMAN
L. J. SAVAGE
G. H. VON WRIGHT

Invited speaker:

RUDOLPH CARNAP

Symposium on Alternative Approaches to the Theory of Choice

Chairman:

W. K. ESTES

Participants:

R. J. AUDLEY
ANTHONY DEUTSCH
MASANAO TODA

Invited speaker:

ERNEST HILGARD

Symposium on Macro and Micro Economics

Chairman:

KENNETH ARROW

Participants:

KENNETH O. MAY
ANDRE NATAF
J. R. N. STONE
HENRI THEIL

Invited speakers:

JOHN HARSANYI
PAUL LAZARSFELD

1959 Proceedings of the SOCIAL STATISTICS SECTION

This is the second annual edition of the *Proceedings* of the Social Statistics Section containing most of the papers given under the sponsorship of the session at the Annual Meeting in Washington, D. C., December 27-30, 1959. Fourteen sessions are included, containing papers in the following categories:

I. Data Evaluation Processes
II. Labor Force Measurement and Interpretation
III. Innovation in Statistical Research in Social Science
IV. Contributed Papers
V. Place of the 1960 Census in the Evolution of Important Census Concepts
VI. Demographic Facts and International Political Realities
VII. Educational Research Through Applied Statistical Methods
VIII. Some Methodological Problems in Surveys
IX. Ratio Estimation
X. Statistical Definitions, Concepts and Categories
XI. The Planning and Financing of Social Research
XII. How the 1960 Census will be Taken
XIII. Social Statistics: The Organization for Policy Use
XIV. Quantification and Measurement in Biological and Social Sciences

These *Proceedings* are priced merely to recover the cost of publication and mailing. Special price to members of the American Statistical Association: $2.50; price to nonmembers: $3.00 ($.25 will be added to the invoice if order is received without remittance). If possible, please include your remittance with your order, and send to—

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American Motors	*Allis-Chalmers*
Bendix Aviation	*Fairchild Eng.*
Boeing Airplane	*Goodyear*
No. Am. Aviation	*Curtiss-Wright*
Rohr Aircraft	*Martin Co.*
Rep. Aviation	*Stude-Packard*
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NEWS ABOUT MEMBERS

Charles C. Beazley has been appointed Staff Statistical Specialist with Post Division, General Foods Corporation, Battle Creek, Michigan.

Morton Boisen has resigned as Chief of the Methods, Procedures and Quality Control Branch of the Decennial Operations Division, Bureau of the Census, to accept a position in private industry.

Larry W. Cheeves has changed his position from Operations Research Analyst for the Convair Division of General Dynamics, Fort Worth, Texas, to Research and Economic Analyst for the DX Sunray Oil Company, Tulsa, Oklahoma. The main functions of the new position will include analysis of current levels of operation in the petroleum industry and an 18-month forecast of these levels. The position also requires basic analysis involved in short and long-range marketing planning.

E. Myles Cooper has been promoted to Assistant Chief of the Division of Program Statistics and Analysis, Bureau of Public Assistance, Social Security Administration.

Richard M. Cyert, Professor of Statistics, Graduate School of Industrial Administration, Carnegie Institute of Technology, presented a paper on "Statistical Sampling for Accountants and Auditors," at the 14th Annual Tulsa University Conference of Accountants held in Tulsa, Oklahoma, on April 20.

Robert G. Demaree has joined the Washington Facility Staff of Psychological Research Associates, Inc.

Carl R. Doering, Professor of Preventive Medicine and Public Health and Director. The Biostatistical Unit, University of Oklahoma Medical Center, attended the Biometric Society Symposium on Quantitative Methods in Pharmacology held at the University of Leyden, the Netherlands. May 10 to 13th, 1960.

J. Fairfield is now employed as a Statistician by the Carborundum Corporation, Niagara Falls, New York.

E. B. Godsey recently joined the Collins Radio Company as an Associate Quality Control Engineer in the Quality Control Division.

Selma F. Goldsmith has transferred from the Office of Business Economics, Department of Commerce, to be Chief of the Consumer Income and Expenditures Statistics Branch of the Population Division, Bureau of the Census.

James E. Gorham is head of Aviation Economic Research for the Southern California Laboratories, Stanford Research Institute, Pasadena. In this position he is responsible for developing contractual research for aviation manufacturers, aircarriers, airports and governments.

E. J. Gumbel, Columbia University, participated in the June meeting of the International Statistical Institute in Tokyo and will give papers on the theory of extreme values at the Universities of Kyoto, Osaka, Tokyo (Institute of Technology), and Manila. During July he will give a course on mathematical statistics at the Chulalongkorn University, Bangkok, Thailand.

Nathan Keyfitz will be in Buenos Aires for several months to assist the Argentine Government to prepare for its forthcoming national census. Mr. Keyfitz is on leave from his position as Professor of Sociology at the University of Toronto to serve as a UN technical assistance expert.

Lloyd A. Knowler, formerly Chairman, Department of Mathematics and Astronomy, State University of Iowa, has accepted an appointment as Mathematical Statistical Adviser (Statistical Quality Control) with the International Statistical Programs Office, Bureau of the Census. His new position will be at Calcutta, India.

Paul Krueger will act as Assistant Chief of the Office of Statistical Standards, Bureau of the Budget, during the absence of Peyton Stapp who has accepted an appointment with the UN Economic Commission for Latin America.

Gilbert Lieberman, formerly a Mathematician with the Naval Ordnance Laboratory, Silver Spring, Maryland, is now a Senior Engineer with the Radio Corporation of America, Camden, New Jersey. **Forrest E. Linder,** Director of the U.S. National Health Survey, has returned from a three months assignment with the International Cooperation Administration in New Delhi for the purpose of assisting the Indian Government in developing a program of bio-statistics. He prepared a report and recommendations on the organization of health statistics in the Indian Directorate-General of Health Services.

Alberto B. Manzanero has recently been appointed as Administrative Assistant to the General Sales Manager of Filoil Refinery Corporation, a Filipino concern affiliated with the Gulf Oil Corporation.

Reino A. Merikallio has accepted a position as Mathematical Systems Analyst with the Advanced Systems Development Division of IBM in White Plains, New York. He has been studying for a doctorate in the Industrial Engineering Department at Columbia University.

John W. Moyer received the Masters Degree in Mechanical Engineering from the University of Nebraska in January and has taken a position in the Quality Assurance Department of the Sandia Corporation in Albuquerque, New Mexico.

Vito Natrella has been appointed as Assistant Director of the Division of Trading and Exchanges, Security and Exchange Commission. He will direct the newly established Branch of Economic Research which will be responsible for SEC statistical programs.

Harlow D. Osborne, Associate Chief of the National Income Division, Office of Business Economics, has been appointed Chief of the Division, succeeding George Jaszi who was recently named Assistant Director of the Office of Business Economics.

Sue Ossman, Principal Research Analyst in the Assistance Analysis Branch, Social Security Administration, has transferred to the Civil Defense Emergency Welfare Services as Operating Statistics Specialist.

N. Marcus Peterson, formerly Reliability Coordinator of the Nuclear Department of Convair, Fort Worth, has moved to Salt Lake City where he is employed by Sperry Utah Engineering Laboratory. His work will be in Systems Reliability.

Margaret G. Reid is on leave from the Department of Economics, University of Chicago, during the spring quarter to serve as food consultant for the Institute of Home Economics of the Agricultural Research Service, U.S. Department of Agriculture.

William T. Sackett, Jr., is now a research supervisor in the Military Products Group Research Division of the Minneapolis Honeywell Regulator Company, Minneapolis, Minnesota.

Ernest M. Scheuer, Space Technology Latoratories, Inc., has received his Ph.D. in mathematics from the University of California at Los Angeles.

Ray Schultz has been appointed Assistant Professor and Assistant Economist in the Economics Department of South Dakota State College, Brookings, South Dakota. He will teach courses in agricultural policy and history of economic thought, and will do research in agricultural policy.

William C. Shelton has been appointed Chief of the Division of Foreign Labor Conditions in the Bureau of Labor Statistics. Mr. Shelton was formerly Manager of Business Research, Florida Development Commission, and earlier served as Head, Statistical Section, U.S. Regional Office in Paris.

Peyton Stapp, Assistant Chief of the Office of Statistical Standards, Bureau of the Budget, has accepted an appointment as Regional Statistician with the United Nations' Economic Commission for Latin America at Santiago, Chile.

Charles E. Swanson has been appointed Assistant Director of Research of The Curtis Publishing Company. He had formerly been Manager of Research for The Saturday Evening Post.

Richard Usher, Engineering Psychologist in the Advanced Engineering Division of Lear Inc. has joined an engineering research group working on a methodology (sponsored by Flight Control Laboratory, WADD, USAF) which may be used in the design and development of instrumentation for complex man-machine systems. **Frances Wattenberg,** formerly in the Division of Manpower and Employment Statistics, has transferred to the Division of Prices and Cost of Living, Bureau of Labor Statistics.

Arthur J. Wilburn, formerly with the Directorate of Management Analysis, has been appointed Staff Specialist for Statistical Sampling and Analytical Techniques in the Office of the Auditor General, Comptroller of the Air Force.

CHAPTER NOTES

Albany

A luncheon meeting was held on April 20th at which Morris H. Hansen, Assistant Director for Statistical Standards, Bureau of the Census, and President of the American Statistical Association, was the speaker. Mr. Hansen's subject was, "New Developments in Census Methods."

The Albany Chapter was co-sponsor with the American Society for Quality Control, the American Institute of Industrial Engineers, and the Management Operations Research Group, of a Symposium held the afternoon and evening of May 12th at the Hotel Ten Eyck, Albany. At the afternoon session the speakers were Arthur Zoellner, General Electric Co., whose topic was, "Basic Theory of Evolutionary Operations;" Donald A. Wright, Eastman Kodak Company, who spoke on "An Application of Evolutionary Operations to the Paper Industry;" Nyles V. Reinfeld, National Institute of Management, Cleveland, Ohio, who discussed "Industrial Application of Mathematical Programming;" and Irwin D. J. Bross, Roswell Park Memorial Institute, whose subject was "Major Public Decisions: Application to Automobile Accidents." At the evening session Robert Mitchell, General Electric Co. Training Specialist, spoke on "Missing the Boat—How do you Build a Man with the Capacity to Carry?"

The Seventh Annual Conference on Statistics, sponsored by the Albany Chapter, was held on May 19th at the Manger DeWitt Clinton Hotel. The subject of the Conference was "Opinion Polls and TV Ratings." The keynote address was delivered by Dr. William J. Ronan, Secretary to the Governor. At the morning session, Dr. Paul Wheeler, New York State College for Teachers, discussed "Historical and Theoretical Development of Opinion Polls," and Irving Roshwalb, Audits and Surveys Co., Inc., spoke on "Current Methodology and Techniques in Opinion Polls." The speaker at the luncheon session was Dr. Robert S. Herman, Division of the Budget, who discussed "Administrative Practices in a Changing World." William M. Weilbacher, Dancer-Fitzgerald-Sample, Inc., spoke on "Formulation, Interpretation and Significance of TV Ratings" in the afternoon. This talk was followed by a panel and general discussion. The members of the panel were Dr. Paul Wheeler, Irving Roshwalb and William M. Weilbacher.

Central New Jersey

A meeting was held at Princeton University on May 24th on "Operational Gaming in Psychological Research." Frederick Kling, Research Associate with the Educational Testing Service, was the speaker.

Chicago

At the April 4th dinner meeting, held in the Art Institute Club Room, the speaker was Frank J. Anscombe, Associate Professor of Princeton University and currently a visiting professor in the Department of Statistics, University of Chicago. Professor Anscombe's subject was "Bayesian Statistics." This refers to a method of argument first used by Thomas Bayes (1702-61) in which there has recently been renewed interest among theoretical statisticians. Professor Anscombe described the new movement and some possible practical applications. Professor Harry Roberts of the University of Chicago was commentator.

Dean Swartzel, Deputy Director, and W. Raymond Mills, Chief of the Research Division, Northeastern Illinois Metropolitan Area Planning Commission, spoke at the May 5th dinner meeting. The purpose, organization, present activities and future plans of the Commission were discussed, as well as current findings on the Chicago Standard Metropolitan Area.

A luncheon meeting was held on April 7th at which Dr. Howard G. Roepke, Associate Professor of Geography at the University of Illinois, discussed "Impact of the St. Lawrence Seaway—What It Means to You!". At the April 20th luncheon I. "Blackie" Davidman, President of Chartmasters, Inc., spoke on "Chart Chicanery." Dr. Arthur R. Tebbutt, Professor of Statistics at Northwestern University, discussed "Measurement of Seasonal Variation—The Link-Relative Approach" at the May 17th luncheon meeting.

The seventh Annual Mid-West Conference, co-sponsored by the Chicago Chapter and the Chicago Association of Commerce and Industry, was an outstanding success. This Conference, which was held on March 25th and 26th, had as its theme "Modern Tools for Modern Management." The total registration of nearly 350 was more than in any previous year. Among the factors contributing to this success were the timeliness of the Conference theme, the presentation of the individual topics, the stature of the speakers obtained for the program, and the all-day Saturday session devoted to the actual playing of a management game on an IBM computer.

Cleveland

At the January meeting, Professor J. N. Berrettoni, Chairman of the Statistics Department of Western Reserve University, gave a talk entitled, "Statistics in Reliability."

Dr. Robert W. Burgess, Director of the U. S. Bureau of the Census, spoke on "Statistics in Decision-Making" at the February meeting.

The March meeting heard Dr. Carl F. Kossack, Manager of Statistics and Operations Research, IBM Research Division, Yorktown Heights, N. Y. Dr. Kossack's subject was "Statistics and Operations Research in Industry."

Connecticut

The annual meeting of the Chapter was held May 5th at Yale University, New Haven, Connecticut. The following officers were elected:

President—Dr. Hilary L. Seal, Department of Zoology, Yale University
Vice-President—Mr. Herbert R. Tacker, The American Brass Company, Waterbury, Connecticut
Secretary-Treasurer—Mrs. Myrna Seal, Stochastic Calculations, Inc. New Haven, Connecticut

Dayton

Election of officers for the 1960-61 season was held at the Chapter's May 3rd meeting. The officers are as follows:

President—John J. Stansbrey
Vice-President—Theresa Fricke
Secretary-Treasurer—Mrs. Freda Witherow Kurtz

Detroit

Dr. Sidney Borden, Director of the Department of Research and Statistics, First of Michigan Corporation, was the speaker at the April 27th dinner meeting on the subject, "Treacherous Standards in the Stock Market." Dr. Borden appraised technical forecasting methods and also discussed mutual funds. The guest chairman was Dr. Lawrence H. Seltzer, Department of Economics," Wayne University.

Milwaukee

At the March 24th meeting, Dr. David Blackwell, Chairman of the Department of Statistics, University of California, spoke on "Information Theory—The Theory of Games."

The April 6th meeting was held in cooperation with the Business Education Department of the Milwaukee Vocational and Adult Schools. Morris H. Hansen, Assistant Director for Statistical Standards, Bureau of the Census, and President of the American Statistical Association, spoke on the 1960 Census of Population and Housing.

Nebraska

On February 9th, the Nebraska Chapter of the American Statistical Association held a joint dinner meeting with the Lincoln-Omaha Chapter of the American Marketing Association at the Cornhusker Hotel. Mr. J. T. Miller, Director of Research of the Meredith Publishing Company of Des Moines, Iowa, addressed the the members of the two organizations on "Magazine Research—Why and How at Meredith."

The March meeting of the Nebraska Chapter was held at the New Student Activities Center of the Municipal University of Omaha. Professor William E. Jaynes of the Department of Psychology of the University of Omaha addressed the Chapter on "The Measurement of Meaning."

The April meeting was held at the University of Nebraska in Lincoln, Nebraska and featured Professor John Gurland of the Iowa State University Statistical Laboratory. Professor Gurland addressed the Chapter on "Applications of Contagious Distributions."

New York

The subject of the March 22nd meeting, sponsored jointly by the Biostatistics and Social Statistics Divisions, was "Application of Computers in Medical and Health Research Problems." The speakers were P. H. Kutschenreuter, U. S. Weather Bureau, who discussed "Computer Techniques Used in Correlating Weather and Mortality"; Howard Levene, Department of Mathematical Statistics, Columbia University, who spoke on "Use of a Computer to

Obtain the Distribution of a New Statistic by the Monte Carlo Method"; and Henry Quastler, Department of Biology, Brookhaven National Laboratory, who talked on "Significance Tests of Periodicities by Monte Carlo Methods." The chairman of the meeting was Donald Mainland, Department of Medical Statistics, N. Y. U. College of Medicine.

The April 7th meeting, sponsored by the Statistical Techniques Division, dealt with "Some Applications of the Theory of Games to Economics and Statistics." Dr. Harlan D. Mills, Market Research Corporation of America, was the speaker; Professor Harry Malisoff, Brooklyn College, was discussant; and Nathan Morrison, N. Y. State Division of Employment, was chairman.

The Physical Sciences and Engineering Division sponsored a meeting on May 4th on the subject of problems in stochastic processes. Dr. Ralph Bacon, General Precision Laboratory, Pleasantville, N. Y., spoke on "Runs or Sequences in Correlated Data," and Dr. Allan Block, General Precision Laboratory, discussed "Stochastic Processes in Random Noise of High Order Systems." Arthur H. Walner, Material Laboratory, N. Y. Naval Shipyard, was chairman.

On May 5th the Chapter held its all-day Annual Forecasting Conference. Sessions were held on Short-Range Business Forecasting, Sales Forecasting, Growth Patterns in American Industry, and Stock Market Forecasting. At the luncheon session James Knowles of the Joint Economic Committee of the U. S. Congress discussed "Long Range Trends in the U. S. Economy." The conference was a huge success, both from the standpoint of interest and from a financial viewpoint. There were 375 people who attended, many of them members of other associations.

The final meeting of the 1959-60 season was held on May 18th. The topic was "International Patterns of Industrial Growth," with Abraham Aidenoff, Statistical Office of the United Nations, the speaker, and Goran Ohlin, Economics Department of Columbia University, discussant.

Puerto Rico

The ninth annual assembly of the Puerto Rico Economics and Statistical Association, a chapter of ASA, was held on March 12, 1960, at the University of Puerto Rico. During the professional session, a paper by Messrs. Dudley Smith and William M. Requa of the Association of Sugar Producers of Puerto Rico, entitled "Some Economic Considerations in Restoring Puerto Rican Sugar Production to Quota Levels" was read by the former. Comments were made by Messrs. Raul J. Tous of the Department of Agriculture and Commerce; Eduardo Estella, president of the "Sector de Colonos de Cana, Associacion de Agricultores"; and J. B. Garcia-Mendez, Executive Vice-President of the Association of Sugar Producers, followed by a general discussion from the floor. The professional meeting was adjourned at 1:00 p.m.

Cocktails were served at the Faculty Club and the luncheon meeting got underway at 2:00 p.m. The president, Mr. Alvin Mayne, inaugurated the business proceedings with brief remarks on the Association's activities, followed by the annual reports of the Secretary and the Treasurer. Mr. Robert Carleton, who had represented the Association at the annual convention of the American Statistical Association, gave a report on his activities, on behalf of the Association, while there, and his general impressions of the reports of other chapters that might prove relevant to our future development.

Several resolutions were adopted: one to the widow of Mr. Donald O'Conner; another to Messrs. Jose Luis Gomez Villanueva and Eliseo Morales expressing the assembly's apologies for the reception given to their efforts at preparing papers for a scheduled December 9th meeting; to Mr. Alvin Mayne for his success in the editing and publication of the inaugural issue of our journal; and for greater statistical coordination between the heads of government agencies and the professorial staff of the university.

The nominations committee submitted a report on their canvass of members, following which the present Executive Committee was unanimously re-elected.

The Committee on Professional Norms was nominated, consisting of Mr. Guillermo Irizarry, Chairman, and Messrs. H. C. Barton, Jr., Vernon R. Esteves and Carlos J. Lastra.

Slightly over 80 persons attended the professional session, and there were 32 present at the luncheon meeting.

Rochester

On Tuesday evening March 8th, Dr. James Morgan, Program Director, Survey Research Center, University of Michigan, spoke to the Rochester Chapter on the annual Survey of Consumer Finances. The meeting was held at the University of Rochester and was scheduled in conjunction with the University's Economics Department.

Dr. Morgan elaborated on some of the unique problems encountered in the Survey of Consumer Finances. Measuring attitudes is a necessary part of the Survey and the researchers go to a good deal of trouble to check responses to attitude questions against known events. He pointed out that even with the small sample, it is impossible to correlate all of the variables.

The sample design was of great interest to those present and Dr. Morgan elaborated on it. The sample must be a reliable one of course, but, in addition, it must be selected in such a way that there is "clustering" in order to eliminate costly travel by interviewers. He mentioned some of the practical problems encountered in the Survey such as missed dwellings, non-response, missing information, and bias in the sample on "defensive issues" such as small loans. A lively question period followed his talk.

In December and February, the Rochester Chapter held joint meetings with the Technical Sub-Group of the Rochester Society for Quality Control.

Saint Louis

At the April 21st meeting Hugh Nourse, Roy Wenzlick & Co., substituted for James Meigs, Federal Reserve Bank of St. Louis, when Mr. Meigs was unable to appear as scheduled. Mr. Nourse's subject was "The Effect of Public Housing on Property Values".

Mr. Meigs spoke at the May 19th meeting on "Measurement of Bank Responses to Interest Rates and Free Reserves". He discussed a study in which he had attempted to measure bank demand for excess reserves and borrowings from the Federal Reserve Banks, or the two as combined in free reserves.

Future meetings are scheduled as follows:

June 16—William A. Clark, Monsanto Chemical Company, "Use of Electronic Computers in Market Research."

October 20—Dr. Frederick Williams, University of Missouri, "Statistics—Operations Research."

November 17—Dr. George Coleman, Mercantile Trust Company, "Annual Forecast and Outlook for 1961."

Officers of the St. Louis Chapter for 1960 are:

President—George S. Little, Southwestern Bell Telephone Company

Vice-President—Joseph F. Bappert, Roy Wenzlick & Company

Secretary—A. J. Meigs, Federal Reserve Bank of St. Louis

Treasurer—Sarah Boggs, Health and Welfare Council of Metropolitan St. Louis

Southern California

Dr. T. E. Harris, head of the Mathematical Analysis Department at the RAND Corporation, was the speaker at the March 31st dinner meeting. Dr. Harris discussed the requirements of industry for training in statisticians, with particular reference to the RAND Corporation.

The April 21st dinner meeting heard Mr. Clay Braun, Account Representative with the American Research Bureau, Inc., speak on "TV Ratings, Use and Abuse!". Mr. Braun explained some of the involved methods of determining the value of TV shows and discussed the statistical formulas used.

The Southern California Chapter recently made a resume of its activities during the past ten years which may be of interest to other chapters. It has established an employment committee working with universities, Government agencies and private industry that has been quite successful in obtaining jobs for statisticians. It has been associated with the Los Angeles Chamber of Commerce Research Committee in co-sponsoring the Business Outlook Conference, and with the AAAS and other organizations in arranging a seminar at the California Institute of Technology. It has established a standards committee to help develop professional standards for statisticians. Members of the Chapter have served as experts on Civil Service Examination boards. Finally, the Chapter has provided its members with opportunities to hear at its monthly meet-

ings some of the leading men in the field of statistics, and has also provided demonstrations of the new computing machines.

Virginia

The Virginia Chapter of the American Statistical Association held its annual joint meeting with the Statistics Section of the Virginia Academy of Science at the Jefferson Hotel in Richmond, Virginia, on May 13 and 14, 1960. Seventeen papers were presented, covering a wide range of topics in applied and theoretical statistics. The meetings were attended by about thirty-five persons from Virginia and surrounding states.

Plans were initiated for another joint meeting with the Richmond Section of the American Society for Quality Control to be held in October. It is also proposed to hold a joint meeting with the Northeast Tennessee Section of the American Society for Quality Control sometime in the fall.

New officers elected were James Armstrong, Jr., E. I. Dupont de Nemours, President; Elizabeth Angle, Federal Reserve Bank of Richmond, Vice-President; and William A. Glenn, Virginia Polytechnic Institute, Secretary.

Washington

"Use of Statistics in the Settlement of Industrial Disputes: The Steel Strike" was the subject of the April 6th meeting. Philip Arnow, Assistant Commissioner of the Bureau of Labor Statistics, spoke on the labor statistics used, as well as the needs for additional data; Carl W. Messinger, Director of the Iron and Steel Division, Business and Defense Services, discussed the business statistics; and Walter A. Maggiolo, Director, Mediation Activity, Federal Mediation and Conciliation Service, dealt with the mediators' use of statistics. The discussants were James W. Knowles, Joint Economic Committee; Joseph Loftus, New York Times; and Mark Massel, The Brookings Institution. The chairman of the meeting was Mrs. Aryness Joy Wickens, Economic Adviser to the Secretary of Labor.

FRED C. CROXTON, 1871-1960

Fred. C. Croxton, who was elected a Fellow of the Association in the first group ever so honored, died in Washington, D. C., April 3. Born on a farm near Huntsville, Illinois, he came to Washington in 1892 and entered government work, completing his formal education with a Master of Laws degree at Georgetown University. For a year he was in the Pension Office, then in 1893 he moved to the Bureau of Labor, where, except for four years as Chief Statistician of the Immigration Commission, he remained for twenty years. At the Bureau of Labor he supervised the statistical analysis and preparation of the reports on Wages and Prices, and by 1913 he had finished the research and preliminary testing basic to the Cost of Living (now Consumers Price) Index. He was an administrative statistician of widely recognized ability.

In the fall of 1913 he moved to Ohio to become Chief Statistician and Chief Mediator of the Ohio Industrial Commission. As Chief Statistician he organized the statistical reporting system for the Commission. Possessed of great energy, patience, and stamina he was outstanding successful as a mediator and from this time on was frequently called on in public capacity to mediate or arbitrate labor disputes in various parts of the nation. During World War I he was Federal Food Administrator for Ohio and held other important posts concerned with defense and employment. Toward the close of the war he became Assistant General Manager of the American National Red Cross. From 1920 to 1929 he was Director of the Columbus Council of Social Agencies and Secretary of the Columbus Community Fund.

Early in the depression he returned to Washington to become, in October, 1930, a member of President Hoover's Emergency Committee for Employment and then Assistant Director of the President's Emergency Organization for Unemployment Relief. In July, 1932, he was put in charge of emergency relief at the Reconstruction Finance Corporation. From 1933 to 1943 he held various federal posts including Consulting Economist to the Social Security Board and Chief of the Division of Administrative Aid of the Bureau of Unemployment Compensation. After 1943 he engaged in private labor arbitration. His last public service, 1948 to 1955, was as a member of the Fair Employment Board of the Civil Service Commission. Throughout his life he was active in religious work and in 1949 was named Christian Layman of the Year by the Washington Federation of Churches.

MARY LOUISE MARK

YEAR	*PLACE*	*HEADQUARTERS*	*DATES*
1960	PALO ALTO, CALIF.	STANFORD UNIVERSITY	AUGUST 23-26
1961	NEW YORK CITY	ROOSEVELT HOTEL	DECEMBER 27-30
1962	MINNEAPOLIS	LEAMINGTON HOTEL	EARLY SEPTEMBER
1963	CLEVELAND	CASE INST. OF TECH. AND WESTERN RESERVE UNIV.	EARLY SEPTEMBER
1964	CHICAGO	CONGRESS HOTEL	DECEMBER 27-30
1965	PHILADELPHIA	BELLEVUE-STRATFORD HOTEL	EARLY SEPTEMBER

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THE PRESIDENT'S COLUMN—CONTINUED FROM PAGE ONE

to contact Mr. Jones or myself (or any national officer) regarding any feature of Chapter relationships. Each year, at the Annual Meeting, a breakfast meeting is held for Chapter Presidents and Secretaries and District Representatives. It is an excellent opportunity to learn what other groups are doing, as well as exchanging ideas and suggestions.

THE AMERICAN STATISTICIAN carries news of Chapter activities as supplied by the Chapters themselves, and this provides another manner of publicizing local meetings and activities. It also carries a list of the names and adresses of Chapter Presidents and Secretaries, as soon as these are received. And while we're on the subject, Chapters, in planning their fall programs, may wish to have one of the Association's officers as a speaker. Unfortunately, ASA does not have the funds to pay travel expenses for officers; however, we will request that officers let us know their travel plans from time to time, so that arrangements can be made with Chapters in the areas they are visiting.

The Chapters of the Association are largely autonomous bodies. This arrangement has worked well over the years. Volunteer and voluntary participation of interested members insures continuous quality and vitality in meetings and other activities. Chapters control their own finances, professional and technical services, etc. (Several Chapters have been active in advisory capacities to their state governments on standards, salary levels, statistical data, etc.) It should be emphasized that the national office is ready to help with such services as will be useful in promoting and publicizing local programs and in other ways. This includes mailing notices to members in a certain region (or nation-wide), notification annually or semi-annually to each Chapter of all the ASA members in that Chapter's area, collection of Chapter dues, if requested, at the same time as payment of national dues, and so on.

As with any group dependent upon volunteer services, your participation, on an active basis, is essential to the continuing success of the program. Your Chapter's officers are giving substantially of their time and energy to provide meetings of interest to the members in your area. Your help in planning and executing activities is of greatest importance and in this connection, you may wish to contact your Chapter President or Secretary (whose names and addresses appear in every issue of THE AMERICAN STATISTICIAN and the JOURNAL). Chapters, as well as individual ASA members, are urged to suggest topics and speakers for our Annual Meetings and to suggest also the names of members who might be considered by the Nominating Committee.

Digressing somewhat, let me remind you that details of the Stanford meetings, August 23-26, including the preliminary programs, appear in this issue. Some of the highlights include a special invited address to the general membership by Jerzy Neyman on "Indeterminism in Science and the New Demands on the Theory of Statistics"; the Economic Outlook Luncheon where Jesse Tapp will be the speaker; sessions honoring Harold Hotelling, and so on. I hope I shall have the pleasure of seeing you at the 120th Annual Meeting of the Association.

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